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and

Instruction Seminar

AUG. 28 - SEPT. 2, 1955

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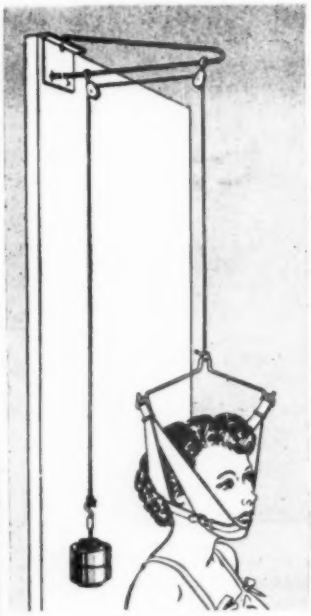

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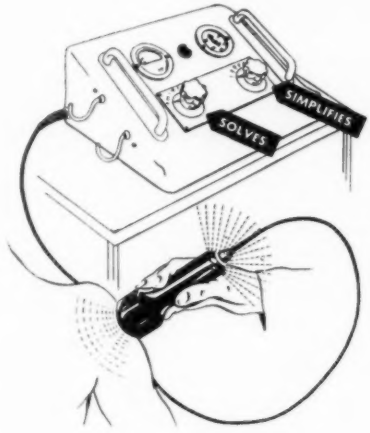

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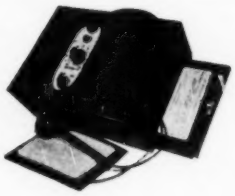

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The Fourth John Stanley Coulter Memorial Lecture

THE HISTORY OF THE AMERICAN CONGRESS OF PHYSICAL MEDICINE AND REHABILITATION

Walter J. Zeiter, M.D.
Cleveland

It is fitting that the subject of this fourth lecture in memory of John Stanley Coulter is the history of the American Congress of Physical Medicine and Rehabilitation. Doctor Coulter's services to the science and art of physical medicine are many. It was my good fortune to have worked closely with him on plans for the Congress and to have had my post-graduate training in physical medicine under his direction at Northwestern University in Chicago. I shall never forget his congenial personality, his sincere enthusiasm for his chosen specialty, and his ability as an administrator. In addition to his accomplishments in extensive research and many contributions to the literature, Doctor Coulter was a moving force in the activities of the Congress.

I have no doubt that Doctor Coulter would have enjoyed, as I have, the preparation of this lecture on the history of the Congress. For background material, I have reviewed the journals and the official minutes of the several organizations that eventually became the American Congress of Physical Medicine and Rehabilitation, as well as issues of the *Archives* and minutes of our own meetings.

Thirty-one years ago, in October of 1923, the *Journal of Radiology* contained the following announcement: "What is undoubtedly a very significant development in the Field of Radiology and Physiotherapy occurred in Omaha on September 18, 1923, when the American College of Radiology and Physiotherapy was organized."[1]

The wide scope of the purposes of the new college, as stated in its constitution, reflected the problems that confronted our founders. Briefly, the objectives, as recorded in the minutes of the College, were.... "to elevate the standards of radiology and physiotherapy, to establish a standard of competency and of character for the practitioners of radiology and physiotherapy, to provide a method of granting fellowships in the organization, and to educate the public, technicians, and the profession to understand that the practice of radiology and physiotherapy calls for special training and that the physicians elected to fellowship in the College have had such training and are properly qualified to practice Radiology and Physiotherapy."[2]

President of the new College was Samuel B. Childs, M.D., of Denver and Roy W. Fouts, M.D., of Omaha, was Secretary-Treasurer. The organizational meeting held in Omaha in September, 1923 is considered to be the first annual meeting of the American College of Radiology and Physiotherapy. About three months later, the second annual meeting convened in Rochester, Minnesota. In an issue of the *Journal of Radiology*[3] that was published shortly after this second meeting, the field of physiotherapy was discussed. The wide scope of the field was pointed out with the qualification that it was not the purpose of the new College to minimize either the value of surgery or that of medicine, but on the contrary, the purpose was to emphasize the importance of certain physical methods which are of great help to the patient as well as the physician. In another section of the editorial, an extreme-

Read at the Thirty-second Annual Session of the American Congress of Physical Medicine and Rehabilitation, Washington, D.C., September 9, 1954.

From the Department of Physical Medicine and Rehabilitation, The Cleveland Clinic Foundation and The Frank E. Bunts Educational Institute, Cleveland.

ly important problem confronting the College was outlined—"The lack of general knowledge on the part of the medical profession of America as to the value of physiotherapy is due chiefly to the failure of our medical schools to teach the subject. Even at this time, when its importance is becoming more generally recognized there are few if any medical schools giving serious attention to this subject in their curricula. This means that several more generations of medical students will complete their courses under the present inadequate instruction. When the medical profession so grossly neglects the intelligent use of this important phase of therapy it is little wonder that cults have sprung up who misuse it and over advertise it."

For those interested in the working plan of the American College of Radiology and Physiotherapy, extracts of the constitution are printed on the editorial page of the March 1924 issue of the *Journal of Radiology*.

At the fourth annual meeting of the College, held in Chicago in 1925, an interesting shift of emphasis occurred. Less attention was given to the therapeutic use of x-rays than to other forms of physical therapy.

Also at this meeting, the president appointed a committee to study the question of the official publication of the College, which at that time was the *Journal of Radiology*. As a result of this committee's decisions, a new publication, the *Archives of Physical Therapy, X-ray, Radium* was established as the official organ of the College on January 1, 1926. Dr. A. R. Hollender was appointed its Editor and Dr. A. F. Tyler was the Managing Editor.

In 1926, three years after the founding of the College, the increase in membership necessitated the division of the membership into districts. Five such districts were established — Midwestern, Mississippi Valley, Western, Eastern, and Southern.

The promise of further membership expansion was offered in 1927 when the American Electrotherapeutic Association, at that time the oldest physical therapy association, and the American College of Physical Therapy met in their first joint session.[4] It is interesting to note the number of other physical therapy societies active at that time. They were the New England Association for Physical Therapeutics, Western Physiotherapy Association, Mississippi Valley Physiotherapy Association, and Canadian Association of Electro-Physiotherapy.

In January 1928[5], Dr. A. R. Hollender retired as Editor of the *Archives of Physical Therapy, X-ray, Radium,* and Dr. Disraeli Kobak was named his successor.

Despite the tremendous growth of the American College of Physical Therapy by 1928, it had not obtained complete recognition by the American Medical Association. The specialty of physical therapy and physicians belonging to its societies were not listed in the A.M.A. Directory, and a resolution was introduced at the meeting of the College to urge that such recognition be given.

In 1929, the American College of Physical Therapy convened in Chicago, and the membership elected to change the name of the organization to the American Congress of Physical Therapy. The change was made to give the organization wider scope in its usefulness to the medical profession, to reflect the popularity and unusual successes of its annual meetings, and to provide for its expected continuous growth.[6]

The first meeting of the directors of the American Congress of Physical Therapy was held at 30 North Michigan Avenue in Chicago, on Monday, April 21, 1930. At this meeting, the Congress became incorporated and adopted a new constitution. Among the objectives listed in the new constitution were "to alleviate human suffering and prolong human life by and through the study, promotion, and scientific development of Physical Therapy; to elevate the standards to establish standards of competency and of character for practitioners thereof; to finance research; to sponsor, promote and develop a Registry of Technicians for the purpose of elevating the standards of lay technicians."

Of almost equal significance at that

first meeting of the directors was their acceptance of a proposal by Dr. A. F. Tyler of Omaha, Nebraska, to transfer to the corporation as a gift, the ownership of the *Archives of Physical Therapy, X-ray, Radium*. A well-deserved tribute was offered to Dr. Tyler in the May, 1930 issue[7] of the *Archives* when it became the property of the Congress.

During the great national financial depression, a sign of the times occurred in the minutes of the Congress in 1931. The members were having financial difficulties. A partial solution to the problem for the Congress itself was explained by Dr. Hollender — "After discussion the following motion was adopted: that forty or more members make a loan of fifty or more dollars to the Congress, and that the fifty dollars be paid $25 in cash and $25 within 30 or 60 days, the amount of the loan to be repaid the member as soon as he is able to secure a number of subscriptions or memberships equal to the amount of his loan, or if the member is unable to secure subscriptions to cover his loan, he is to be repaid within a period of three years by the Congress."

In the April, 1932 issue of the *Archives of Physical Therapy, X-ray, Radium*, a letter to the editor[8] indicated further repercussions of the depression had their good features. In the first paragraph of the letter, Dr. Richard Kovács wrote: "To the editor: As a fellow of both the American Physical Therapy Association and the American Congress of Physical Therapy, I wish to make an earnest plea for the amalgamation of the two societies. Their aims and activities have been running parallel during recent years and most active men belong to both. The present economic crisis has forced some men and will force many more to take their choice and resign from one or the other organization in order to save paying dues to two similar societies. The official journals of both have a hard struggle to meet their publication costs. There is every reason for a determined and unselfish effort to bring the two bodies into a numerically imposing and financially sound organization."

Some encouragement was offered at the next Congress business meeting in New York. Dr. Roy Fouts reported that his committee composed of Doctors Kobak and Kovács had conferred with a like committee of the American Physical Therapy Association to discuss the possibilities of an amalgamation with the Congress and that definite progress had been made by the two committees. Also at that same business meeting, Dr. Frank H. Krusen of Philadelphia stated that a group from Pennsylvania, the Philadelphia Physical Therapy Association, desired to become affiliated with the Congress as a state branch. Definite steps were taken to realize this affiliation.

In July, 1932[9] it was reported that the Pacific Physical Therapy Association had adopted the *Archives* as its official journal. At the convention later in 1932, the Gold Key Award was established by the Congress to recognize annually those who had rendered extraordinary service to the cause of physical therapy.

At the annual meeting in 1933, Dr. Hollender reported the amalgamation of the Congress and the American Physical Therapy Association. As part of the agreement for this amalgamation, the subtitle "Physical Therapeutics", the journal of The American Physical Therapy Association, was incorporated with the *Archives* and the subtitle "Physical Therapeutics" was added to *Archives of Physical Therapy, X-ray, Radium*.

At the annual meeting in Philadelphia in 1934, an important move was made toward raising the professional standing of the physical therapy technician. On the recommendation of Dr. William Bierman of New York City and his committee appointed to study the problem of the establishment of a technicians' registry, a Board of Registry of the American Registry of Physical Therapy Technicians was formed. Also in line with the committee's suggestions, the Board as appointed, consisted of seven members of the American Congress of Physical Therapy who practiced physical therapy exclusively.

In 1936, at the business meeting of the 15th Annual Session,[10] the constitution

of the Congress was amended to add a Fifth Vice-President to the list of officers. Also, at that meeting the position of Editor-in-Chief of the *Archives* was created and Dr. Disraeli Kobak was appointed to assume the post for five years. For long and valuable services to the Congress in an executive capacity, Dr. A. R. Hollender was appointed the Managing Director of the Congress for a period of five years.

The membership of the Congress was further increased in 1936 when a state and local society in Pennsylvania and Philadelphia were affiliated with the Congress.

In 1937, the officers of the Congress proudly announced the achievement of a long-desired objective.[11] At a meeting of the Board of Trustees of the American Medical Association, official authorization had been granted to include the Congress in the list of special societies in the Directory.

With the January, 1938 issue[12] the terms "x-ray" and "radium" were eliminated from the title of the official publication of the American Congress of Physical Therapy and the publication was known as the *Archives of Physical Therapy*. The change reflected the fact that the educational program of the Congress had been restricted primarily to physical therapy.

Later in the same year, a new society, the Society of Physical Therapy Physicians, was formed with forty-two charter members for the purpose of developing physical therapy as a recognized specialty.[13] The group was formally recognized during the 18th Annual Session of the Congress. As the name implies, its membership was restricted to those physicians who devoted themselves exclusively to the practice of physical therapy in contradistinction to that of the American Congress of Physical Therapy which included all ethical physicians and surgeons interested in physical therapy.

At the 19th Annual Session of the Congress in Cleveland, in September of 1940, the position of Executive Director was established in addition to the regular offices, and the title "secretary" was changed to "executive secretary." At that meeting it was also decided to replace the publication committee by an editorial board of five members to ease the burden for Dr. Disraeli Kobak, Editor-in-Chief of the journal. The Board was to assist the shaping of any future policy and to lend material support to the official publication of the Congress.

Dr. Kobak became Editor Emeritus in July, 1941, and the Editorial Board assumed the responsibilities for the editorial work of the *Archives*. During his years in office as Editor-in-Chief, Dr. Kobak contributed extensively to the growth of the Congress. He helped to formulate many Congress policies and devoted prolonged and sincere efforts in the development of our journal.

During World War II, the Congress contributed in various ways to the war effort. Many members were called into active service and committees of the Congress cooperated with the government.

At the business meeting in September, 1944[14] the most important decision reached was that the term "physical medicine" be substituted for "physical therapy" in the names of both the Congress and its journal. The decision was in keeping with the newer concepts of the scope of our work, including the diagnostic as well as the therapeutic utilization of physical agents.

The leading editorial[15] in the May, 1945 *Archives* was entitled "Physiatrist vs. Physical Therapist." In that issue the committee on terminology of the American Society of Physical Medicine published its reports. The editorial commented that "It is significant that an editorial in the *Archives* pleaded seven years ago (see reference 16) for the development of the term 'physiatrist' and the caption of the present editorial was made identical to pay tribute to the foresight of our Editor Emeritus. The editorial pointed out that the adoption of the new term involves neither legal nor philologic obstacles and it offers a dignified designation that implies recognition and management of disease in which physical remedial measures are indicated.

Circumstances were not ripe for action on that proposal seven years ago, as they are now. . ."

During World War II, shortly after this editorial appeared, the National War Committee on Conventions urgently requested that, because our Nation was at war, our 24th Annual Meeting scheduled for September, 1945, be cancelled. This was the first and only time since the Congress was founded that an annual meeting was not held.

In May, 1946,[17] an editorial was reprinted from *The Journal of The American Medical Association* that contained the announcement that the Council on Physical Medicine had voted to sponsor the term "physiatrist" as the designation for the physician specializing in physical medicine. Dr. Kovács commented in the *Archives* that the action of the Council represented another important move in the evolution of physical medicine to its proper status. He stated "It is to be hoped that before long the final step, the official establishment of a specialty qualifying board on physical medicine will become an accomplished fact."

In November, 1947,[18] the *Archives* contained the editorial entitled "Diplomates in Physical Medicine" which read in part "The organization of an American Board of Physical Medicine, by authority of recognition by the Advisory Board for Medical Specialties, marks the consummation of many years of patient laboring toward that goal. The induction of the first group of diplomates in physical medicine at the recent meeting of the American Congress of Physical Medicine in Minneapolis, in the presence of the full eleven member board under the chairmanship of Dr. Frank Krusen, was an impressive occasion indeed..."

At the business meeting of the Congress in Cincinnati in September, 1949,[19] the membership voted to take steps to cooperate with the British Association of Physical Medicine in the formation of an International Federation of Physical Medicine. The meeting of the Council of the British Association of Physical Medicine was held on March 21, 1950, and Dr. Frank H. Krusen, representing the Congress, assisted in the planning of the next International Congress of Physical Medicine to be held under the auspices of the reorganized International Federation of Physical Medicine.

At the Congress business meeting in Boston in August, 1950, The John Stanley Coulter Memorial Lecture was established in memory of Dr. Coulter who had died shortly before that meeting, after many years of outstanding service to the Congress as its treasurer. Also at that meeting the name of the American Registry of Physical Therapy Technicians was changed to the American Registry of Physical Therapists.

Before the Congress met again, Dr. Richard Kovács and Miss Marion G. Smith died. Dr. Kovács had a distinguished career in medicine. For many years he was Secretary of the American Congress of Physical Medicine and Rehabilitation, and a member of the Editoral Board of the *Archives*. A fellowship fund was established by the Congress in his memory. This fund will be used to send one or two young members of the Congress to the International Federation of Physical Medicine in Denmark in 1956. Miss Smith served as Executive Secretary of the Congress for twenty-one years, and was closely associated with the many developments in the field of physical medicine.

In the October, 1952 issue of the *Archives*, the editorial[20] stated "The recent meeting of the Congress in New York was a noteworthy one for many reasons. To begin with, it was our thirtieth anniversary, and in keeping with rapid growth in our specialty we again changed our name, we hope for the last time, to the 'American Congress of Physical Medicine and Rehabilitation.' The *Archives* will also follow suit and we now have our American Medical Association section, our specialty board, Society, journal, and Congress all in agreement as to nomenclature." At that meeting the Registry Board was increased from seven to nine members. The two additional members are to be appointed by and represent the American Physical Therapy Association.

Through the years, the Congress has made progress step by step, but the growth and continued stimulation of an organization is dependent on its problems. In the Archives of November, 1953,[21] the President pointed out the current problem to the membership in his statement that "The Board of Governors considered many matters of great importance to the Association of the Advancement of Physical Medicine and Rehabilitation. Of the more important of these was the jurisdictional dispute which has arisen in the American Medical Association between physical medicine and rehabilitation, and our closely related specialty of orthopedics. These specialties, supplementary to each other, have not as yet adjusted their positions to enmesh their work properly. The smooth manner in which these specialties function in many medical groups attests to the fact that they can and will get along together."

The "dispute," of course, refers to the resolution introduced by the Section of Orthopedic Surgery requesting that we discontinue using the word "rehabilitation" in all of our titles. This matter is at present under consideration by the American Medical Association.

And now it is September, 1954. The history of the Congress continues, as we meet here in our 32nd Annual Session. The Congress and the field of physical medicine have made momentous progress in these years. Our history has been crowded with individuals, ideas, and actions that have fostered our growth. We have a proud past, and I have every confidence that we will have an illustrious future.

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Quantitative Observations on Skeletal Muscle Undergoing Denervation Atrophy

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The phenomenon of denervation atrophy of skeletal muscle has been observed since ancient times. The literature reveals a wealth of qualitative material concerning all phases of this condition. Little, however, has been written on the quantitative aspects of this phenomenon. It is the purpose of this study to attempt an accurate measurement of the gross and histologic structural changes which occur after transection of the nerves supplying skeletal muscle. The alterations to which we refer are (1) reduction of weight of muscle; (2) numerical increase in muscle fibers per unit area; (3) reduction of the diameter of muscle fiber, and (4) proliferation of subsarcolemmal nuclei.

Willard and Grau[1] made a study of the histologic changes which occurred in the leg muscles of white mice. They reported a decrease in the diameter of muscle fibers of as much as 68 per cent following 63 days of denervation.

Tower[2] noted that the proliferation of muscle nuclei and the reduction of the diameter of muscle fibers were the first observable reactions to denervation of the skeletal muscles of the adult cat. Chor and associates[3] observed an 88 per cent reduction of muscle weight in monkeys 12 weeks after nerve section. Proliferation of nuclei and narrowing of muscle fibers were the earliest changes they observed.

Knowlton and Hines[4] attempted to establish an atrophy-rate curve for rats, mice, guinea pigs, dogs and pigeons. They could predict the rate of atrophy on the basis of a species-characteristic constant "K." Owing to genetic factors, the dog did not conform to a predicted atrophy-rate curve.

Altschul[5] reported a reduction in the weight of muscle of as much as 64 per cent following the denervation of the skeletal muscles of the cat and the rabbit, after 40 to 113 days. The muscle nuclei increased on an absolute and a relative numerical basis.

From their work on man, Bowden and Guttmann[6] concluded that the time of denervation is not the only important factor in the course of denervation atrophy. The influence of age, sepsis, stretch and galvanic stimulation tend to alter the rate and extent of the atrophic changes.

Denny-Brown[7] reported an increase in the number of muscle nuclei which began within the first two weeks after nerve section in the cat. Other workers bear out these findings on a qualitative basis.

Methods

One hundred adult albino rats which weighed between 250 and 300 gm. were used. Unilateral denervation of the leg muscles was done by transection of the sciatic and femoral nerves at the base of the thigh. The muscles of the contralateral intact limb were used for controls. At varied intervals ranging from one through forty days, small groups of the animals were sacrificed. The de-

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nervated and contralateral control muscles were carefully dissected, weighed and sectioned. Longitudinal and cross-sectional specimens were prepared from the normal and the denervated gastrocnemius muscles of two or three representative animals from each group for histologic study.

The number of subsarcolemmal nuclei and the number of muscle fibers per microscopic field were counted. These counts were all made under the same magnification (×430). A delineated rectangular lens, which was inserted into the eyepiece of the microscope, designated the unit area for counting in the microscopic field. Ten fields were counted from each longitudinal section, and the average number of muscle nuclei and the average number of muscle fibers from these ten fields were used as a basis for comparing the corresponding normal and denervated muscles.

The diameter of the normal and denervated muscle fibers was measured with an ocular micrometer. The ocular micrometer was calibrated according to the method of Gage[7]. One unit on the micrometer was found to be equivalent to twenty-three microns. Ten cross-sectional fields were studied from each normal and each denervated specimen. The diameter of twenty normal and twenty denervated muscle fibers was measured from each corresponding field. The values were averaged and these averages were used to compare quantitatively the diameter of the normal with the diameter of denervated muscle fibers.

Results

Comparison of the weight of the normal with the weight of the denervated gastrocnemius, plantaris and anterior tibialis muscles revealed that the loss of weight was negligible for the first three days following nerve section. A curvilinear positive regression of weight was noted as the time after denervation progressed. When these three muscles had undergone denervation atrophy for forty days an individual average reduction of weight of approximately 75 per cent was recorded (fig. 1).

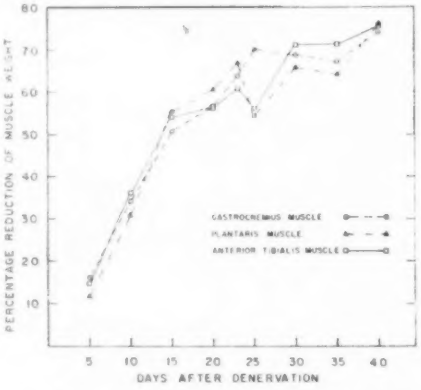

Fig. 1 — Chronologic progressive reduction of muscle weight in denervated skeletal muscle.

In the study of the number of muscle fibers it was observed that there was a consistent variation in the number per unit area among the normal muscles in different animals. For this reason the muscle-fiber count for the denervated muscle of each individual animal was compared with the muscle-fiber count for the normal muscle of that animal. As early as the first postoperative day an average increase of three per cent in the number of muscle fibers per unit area was noted. This increase of fibers per unit area became progressively greater the longer the time after denervation. When atrophy had been in progress for a period of forty days, the average number of fibers per unit area in the denervated muscles was found to be 68 per cent greater than that in the intact normal muscles (fig. 2).

When the diameter of intact normal muscle fibers was measured, individual variations between different animals of the same weight were noted. The average diameter of a single muscle fiber was found to be fifty-seven microns. This, however, is only a numerical average from many animals and was not used as a basis for comparison. Instead, each denervated muscle was compared with the corresponding intact normal muscle of the contralateral extremity of the same animal.

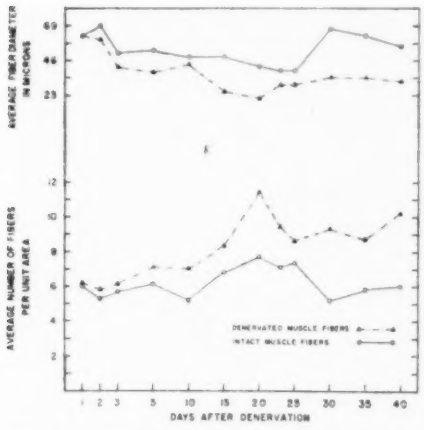

Fig. 2 — Chronologic changes in the diameter of muscle fibers, and number of muscle fibers per unit area in denervated skeletal muscle.

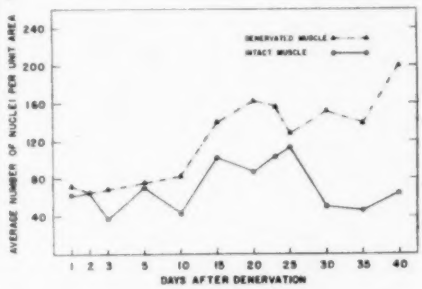

Fig. 3 — Chronologic increase in the number of nuclei in denervated skeletal muscle.

A decrease in the diameter of the denervated fibers was not noted until the second day following section of the nerve. At that time a reduction of thirteen per cent was obtained. The diameter of the fibers continued to diminish but not in a linear proportion with the time after denervation. In the very early stages of atrophy, the percentage of reduction in the diameter of the fibers exceeded the percentage loss of weight of the entire muscle. In the later stages of atrophy, the loss of weight of the muscles was forty-five per cent greater than the reduction of the diameter of the fiber of the individual muscle. When the gastrocnemius muscle had undergone denervation atrophy for a period of forty days, a decrease of forty-one per cent in the diameter of the individual muscle fibers was noted (fig. 2).

An analysis of the changes in the number of nuclei of denervated skeletal muscle demonstrated that these changes were less constant than the alterations in diameter and in number of muscle fibers per unit area. The increase in the number of nuclei per unit area of denervated muscle showed wide variations. Some of these variations may have been due to technical difficulties in preparation of the histologic specimens. Definite trends, however, were noted, but on the basis of what has been observed it is not possible to say that a linear relationship with time exists (fig. 3). Twenty-four hours after section of the nerve an increase of fourteen per cent in the number of nuclei per unit area was noted. When atrophy had progressed for a period of forty days there was an increase in the number of nuclei per unit area of more than 200 per cent. The rate of proliferation between these periods does not show a uniform progression and does not correspond to the rate of reduction in weight of the muscle.

Comment

The atrophy which accompanies denervation of skeletal muscle is evidently a complex phenomenon that alters the entire composition and structure of the muscle fiber. Loss of weight in the entire muscle is not evident until the diameter of the individual muscle fiber has been reduced by about twenty per cent, but thereafter the loss in weight of the entire muscle proceeds very rapidly. During the first fifteen days after denervation, the muscles of the rat lost more than fifty per cent of their initial weight. After fifteen days the rate at which weight was lost was greatly reduced but continued in a progressive course through the forty day period of study. The reduction in the total weight of muscle is not simply a reflection of the reaction of the muscle fiber to denervation. The diminution of the diameter of the fiber can be explained by the loss of cytoplasm. The increased

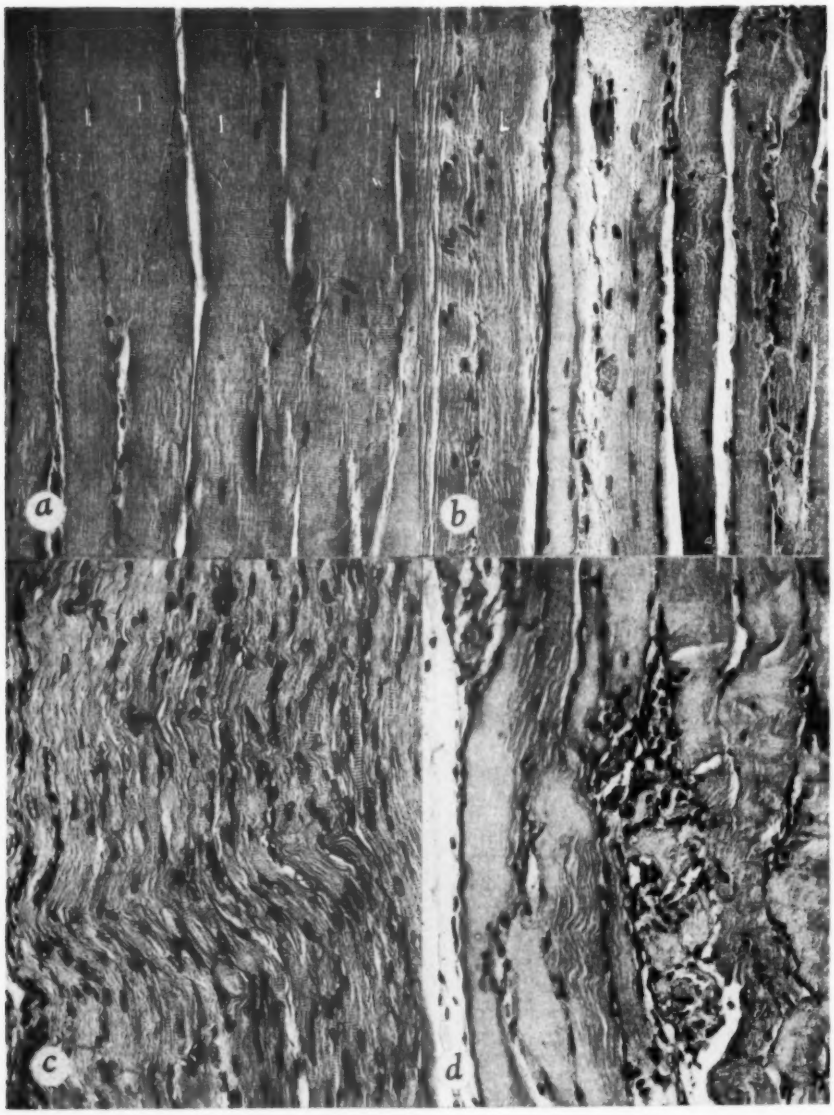

Fig. 4 — Longitudinal sections of skeletal muscles stained with hematoxylin and eosin (x200). a: The normal fibers are large and of fairly uniform width, the subsarcolemmal nuclei are relatively few, thin, and dark-staining and are located usually beneath the sarcolemma. b: Five days after denervation the muscle fibers appear somewhat narrower than normal with variations between them. Some fibers have an increase in the number of nuclei, many of which appear to have invaded the muscle sarcoplasm, while in other fibers the nuclei maintain the subsarcolemmal position and are thin and dark-staining. c: Forty days after denervation there is a fairly uniform extensive atrophy of the muscle fibers with a marked increase in the nuclei, most of which are rounded up, plump and clear. Occasionally the nuclei are clumped. Cross striations in general are well preserved. d: Ten days after denervation there is considerable distortion of the muscle fibers with variable atrophy. In the center of the picture there is a degenerating muscle fiber with a breaking up of the cytoplasm and a marked increase in small nuclei. In another area of the same muscle, the picture is that of a fairly uniform, though variable, atrophy with a moderate increase in the muscle nuclei.

number of muscle fibers per unit area is a relative change due to the reduction of cellular cytoplasm within the muscle fiber and a subsequent concentration of fibers per unit area. The weight lost by the entire muscle is considerably greater than can be accounted for by the reduction in diameter of the individual fibers, as indicated by the fact that when the weight lost by the entire muscle was seventy-five per cent, the diameter of the individual fibers was reduced only forty-one per cent.

The histologic picture of the nondenervated control muscles was that of a normal muscle. The fibers were of uniform width and the subsarcolemmal nuclei were flattened, elongated, dark-staining and located just beneath the sarcolemma. The cross striations were prominent (fig. 4a). Five days after denervation there was already a distortion of the fibers which then were of variable width and staining intensity (fig. 4b). Many of the subsarcolemmal nuclei were more rounded with clear nuclear chromatin, and there appeared to be some displacement of the nuclei from beneath the membrane to within the muscle fiber. These changes were progressive over the period of the experiment although the differences were not uniform in any one area of the muscle. At the end of forty days (fig. 4c) there was marked atrophy of the fibers which were about half the width of the normal. The nuclei were increased in number and variable in appearance, some rounded and clear, others round and pyknotic. It was interesting that the cross striations tended to be preserved in the most atrophic fibers.

During the review of the histologic sections, irregularly distributed muscle fibers undergoing degeneration were noted. The degenerating fibers were usually swollen and darker-staining than normal with an increase in nuclei, or they showed evidence of ballooning with a homogeneous, almost hyaline cytoplasm with small vacuoles and they had rough edges with numerous dark round nuclei in their vicinity (fig. 4d).

In cross section the normal fibers had

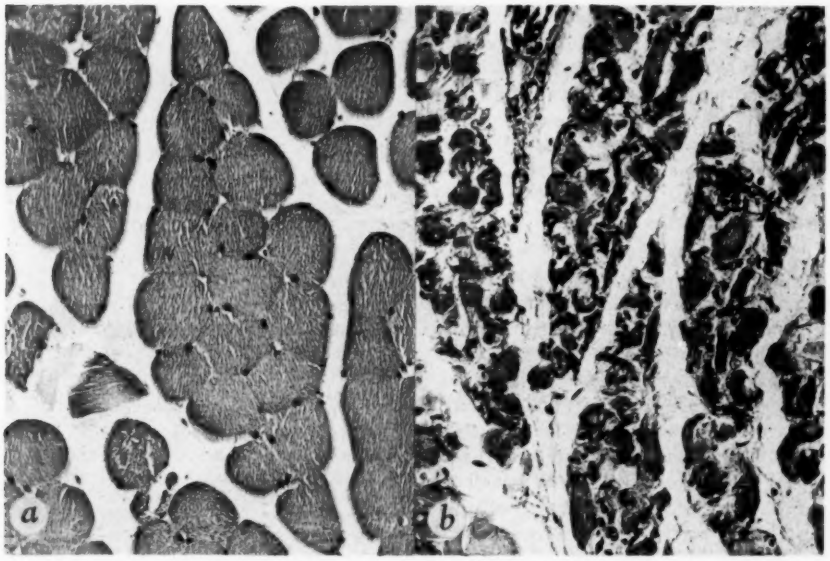

Fig. 5 — Cross sections of skeletal muscle stained with hematoxylin and eosin (x200). a: Normal muscle showing the rounded fibers with the individual myofibrillae, and the location of the small dark-staining nuclei beneath the sarcolemma. b: Forty days after denervation there is considerable variation in the size of the individual fibers with distortion of the fibers. Regular collections of nuclei are found, some in the subsarcolemmal space, others between the fibers or within degenerating fibers.

a fairly uniform round or polygonal shape with occasional dark small subsarcolemmal nuclei (fig. 5a). With increasing atrophy after denervation, a marked variability in size of individual fibers occurred. The nuclei, though generally peripherally arranged, frequently invaded the substance of the muscle fiber. An occasional swollen muscle fiber was seen, such as indicated degeneration when observed in the longitudinal section. Although there was a progressive loss of muscle substance, considerable variability was present as far as individual muscle fasciculi were concerned (fig. 5b).

It was evident that denervated skeletal muscle exhibited proliferation of its nuclei on an absolute and relative basis. During the first week of denervation the nuclei seemed to divide amitotically. The later numerical increase was attributed to the relative changes in the diameter of individual muscle fibers.

The cause and manner of proliferation of muscle nuclei are subjects of controversy. Chor and associates[3] expressed the belief that the proliferation is due to mitosis. From observations on the skeletal muscles of the cat, however, Tower[9] considered it to be due to amitosis. The findings of Tower have been confirmed by Altschul[5]. Since we did not see any phases of mitosis in our observations on the gastrocnemius muscles of the rat, the theory of amitosis is supported.

A possible explanation for the absolute increase in the number of muscle nuclei in denervated skeletal muscle has been proposed by Tower[10]. Her explanation is based on the toxic stimulation of denervated muscle by products liberated from degenerating nerve tissue. Altschul[5] is in agreement with Tower, and further suggests that the reduction of tissue turgor due to the loss of cell material from the muscle fibers is a cause of proliferation of nuclei. He also speculated on the possibility of a teleological attempt toward regeneration. This, however, was only an assumption based on the supposed economy of nature. Speidel[11] explained the tendency of the nuclei to become round in degenerating muscle fibers on the basis of reduction of tension within the fibers.

Summary and Conclusions

The reduction of weight of muscle and the histologic changes which occur in denervated skeletal muscle of the rat have been studied and quantitatively measured.

A reduction of gross weight of muscle was found to be measurable but insignificant on the third day after section of the nerve. As the time after denervation progressed, the reduction of weight of muscle followed a curvilinear positive regression. After forty days of denervation an average loss of muscle weight of seventy-five per cent was observed.

The number of muscle fibers per unit area progressively increased with the increase in length of time after denervation. When the gastrocnemius muscle had undergone denervation atrophy for forty days, a forty-one per cent reduction in the diameter of the individual muscle fibers was demonstrated.

The proliferation of nuclei which occurs after denervation does not take place at a constant rate throughout the muscle. Definite trends were evident, but from the results of this study it is concluded that the proliferation of nuclei does not take place in a linear relationship with time after denervation.

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Dynamic Exercises for Lower Extremity Amputees

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Exercise of the stump is a very important part of the treatment of the amputee in the pre-prosthetic stage. It improves the circulation, increases muscle power, maintains flexible joints, decreases sensitivity, corrects existing contractures and develops coordination[1,2].

Exercises should be started as soon as possible[3]. Left to himself, the amputee invariably maintains his stump in a position of flexion and external rotation[4]. Motions of the stump which emphasize adduction, hip extension[5] and internal rotation are used.

In our opinion, exercises which coordinate the actions of the stump with the rest of the body must be emphasized. This idea has been expressed by many. Titus[6] stated that the physical therapist must not only think of the operated leg but of the lower back and the other leg as well as the shoulders. Brunnstrom[7] wrote that pre-prosthetic exercises are necessary to increase flexibility and to facilitate restoration of body symmetry. She emphasized exercises consisting of lateral shifting of the pelvis in the back-lying position, rocking from side to side in the sitting position, trunk shifting from left to right with a stabilized pelvis and trunk twisting in the sitting position on the mat.

We have devised and have been using a system of dynamic exercises which combine the actions of the muscles of the stump and the rest of the body in the pre-prosthetic phase. These multipurpose exercises strengthen the muscles of the stump with emphasis on the adductors, extensors and internal rotators, as well as decrease sensitivity of the part, increase circulation, maintain flexibility of the joints and promote muscle tone. In addition, these exercises at the same time involve movements of the rest of the body so that the proprioceptive sense is re-educated. Finally the dynamic exercises are similar to those movements which the patient uses when he is walking on his prosthesis. When the non-weight bearing exercises have been accomplished it is found that the actual use of the prosthesis is relatively easy.

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Stump Extension with Anterior Pelvic Thrust

Exercise 1: The patient lies in the supine position with his head elevated and chin resting on the chest to obviate lumbar lordosis. The stump extremity is placed on a seven-inch hospital metal stool. The opposite extremity is flexed on the abdomen so that the distal end is clear of the treatment table. The arms are folded across the chest or clasped behind the neck (fig. 1).

Fig. 1 — Stump extension against stool with with anterior pelvic thrust.

The stump end is pushed forcibly down against the stool so that the pelvis is thrust anteriorly. At first the patients may fear the hardness of the stool. This will be overcome at first by having the end of the stump in the cup formed by the hand of the therapist. This position is not uncomfortable for the therapist and serves to give the patient more confidence.

Some stumps which are less than seven inches (measured from the greater trochanter) may be too short for the use of the metal stool. A roll of towelling about five inches in diameter may be substituted. However, it must be remembered that the smaller the diameter the more difficult it is to extend the stump adequately to obtain the requisite amount of forward thrust of the pelvis.

Resistance Variations: Resistance may be increased by moving the stool more distally. If, in the below-knee amputee, the stool is placed as close to the hip joint as possible, the patient is likely to extend the knee as the exercise is performed. This is an effective way of preventiag and overcoming the tendency towards flexion contracture (fig. 2).

The pelvis is thrust forward as much as possible and held in this position.

If the pelvic thrust is minimal the therapist will assist at first by placing his hand under the pelvis.

Further resistance may be applied by the therapist over the anterior aspect of the pelvis. This may be accomplished in the following ways: 1) The therapist utilizes his weight by pressing elbows on a pillow; 2) the therapist stands on a stool and presses down on the anterior aspect of the pelvis with the hands, keeping the elbows extended and 3) a long canvas strap with weights suspended from each end is placed across the anterior aspect of the pelvis. This method is not as satisfactory as the others described.

Fig. 2 — Resistance applied to the anterior aspect of the pelvis.

The patient places his extended arms alongside the trunk. The arms are pressed against the plinth while at the same time the original exercise is performed. Further assistance may be given when the opposite lower extremity is placed on the plinth. However, the therapist must prevent the utilization of the arms and opposite extremity entirely as this will serve to nullify the purpose of the exercise.

The movements of this exercise are similar to those which occur during prosthetic ambulation when the prosthetic limb enters into the support phase and the contralateral extremity is going into the swing phase immediately after the foot leaves the ground.

Exercise 2: The patient sits erect in the center of the treatment plinth with his lower extremities in neutral alignment. A thickness of flat or rolled towelling is placed under the stump. Some patients, especially those with longer stumps, find that it is more effective to sit at the side of the treatment table. Bilateral amputees prefer to accomplish this exercise on a floor mat.

The patient extends the arm upward and forward towards a designated spot on the ceiling, while at the same time forcibly extending the stump against the towelling and thrusting the pelvis on the involved side anteriorly so that the buttock is lifted off the table surface (fig. 3).

If the stump is five to six inches long it may be possible to extend about 160 degrees. If the stump is longer, the angle of extension is diminished. However, this exercise can be utilized regardless of the length of the stump. We have used it with stumps varying from four and one-half to approximately fifteen inches in length.

Fig. 3 — Extension of stump against the towelling with elevation of the buttock.

Resistance Variations

A: The thickness of the towelling may be from two to six inches. The amount of effort used by the patient varies directly with the thickness of the towelling. If this does not produce the desired result, variations B, C, and D will be found effective.

B: By inclining the trunk forward, the center of gravity will be brought in front of the hip, thus reducing the amount of effort required in the exercise. The therapist verifies by palpation that the extensors are being used. This variation is most frequently combined with variation C.

C: The patient sits erect in the starting position of this exercise. He whips his extended arms forward and downward in an arc while simultaneously performing the remainder of the exercise. This "whipping" motion facilitates stump extension and the lifting of the buttock off the plinth.

D: The therapist assists the patient by placing the hands under the buttock of the stump side. Little effort is required if the movement is coordinated.

The movement in this exercise is analagous to that observed when the above-knee amputee rises from a chair and during the support phase of the prosthetic limb in ambulation. The control of the knee mechanism is in direct ratio to the degree that the trunk is brought forward, upward and over the knee joint.

As long as the hip follows an arc motion which is concave to the ground, the body weight will force the knee mechanism into the lock position. The common tendency in prosthetic ambulation is to incline the body forward at the hip simultaneously forcing the thigh backward, causing the knee mechanism to go into the lock position and then riding over the extended knee. This is minimized by the foregoing described exercise. Furthermore, during the first few days of prosthetic training the patient is made to ambulate with the body in proper alignment. He extends his arms upward and forward.

The therapist presses his own hands against the arms or hands of the patient as the latter moves forward with the prosthetic limb in the support phase (fig. 4).

Fig. 4 — Therapist helping patient maintain proper alignment during early ambulation by pressing against arms.

Exercise 3: Bilateral amputees with short stumps assume an erect sitting position in the middle of the treatment table or on a floor mat with the arms extended at shoulder level. Unilateral amputees or bilateral amputees with one long stump sit on one side of the table with the longer extremity abducted fifteen to twenty degrees and hanging over the edge. This position affords better leverage to the single amputee.

The movement is a more difficult variation of Exercise 2. The patient, in addition to lifting the buttock of the amputation side off the table, propels the body forward by a series of hopping motions; he suddenly whips the arms upward and thrusts the stump quickly and energetically against the table. The assistance of the contralateral extremity is required for balancing purposes. The push should come from the stump extremity (fig. 5).

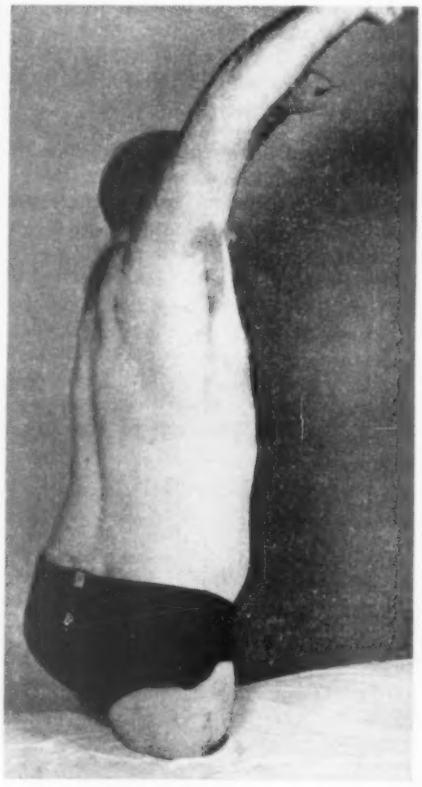

Fig. 5 — Further progression of "Hopping Exercise."

Unilateral amputees, or bilateral amputees with one long stump will invariably use the longer extremity to a very great extent. At first, this should be encouraged. Increased utilization must be made of the opposite stump or extremity as improvement occurs. The

patient inclines his body laterally over the amputation side in order to encourage greater use of the stump.

The resistance will vary with the height of the hop and the distance that the patient is able to negotiate.

The hopping exercise stimulates patients to make greater efforts in obtaining anterior pelvic thrust with stump extension. Patients appear to enjoy the exercise because they see the association of anterior pelvic thrust, stump extension, body lift and forward movement.

Adduction of the Internally Rotated Stump with Lateral Pelvic Thrust

The patient lies in a lateral position with the stump uppermost. The stump is placed on a stool which is covered by a pillow or towel. The opposite limb is flexed in a forward position and held above the table. The trunk is stabilized by resting the underlying arm and the hand of the contralateral limb on the table. If the stump is short the therapist may have to "cup" a hand around the distal end until the patient learns to grip and maintain contact with the stool. This procedure is also effective when the patient fears the hardness of the stool.

The internally rotated stump is adducted downward against the stool while elevating the pelvis (fig. 6). Some

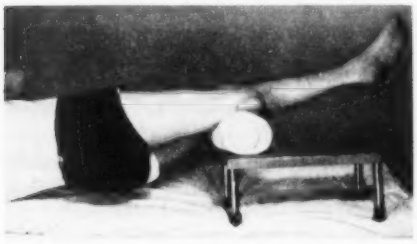

Fig. 6 — Adduction against stool with lateral pelvic thrust.

patients tend to roll forward and thus elevate the rear rather than the side of the pelvis. This is prevented by the stabilization of the upper shoulder and hip by the therapist.

This exercise tends to cause the below-knee stump to go into extension, especially if the stool is placed near the hip joint.

Resistance Variations

The resistance may be varied by procedures similar to those previously outlined.

The stool is moved distally. The range of the pelvic thrust is increased. The therapist may aid the pelvic thrust by placing his hands under the lower hip. The therapist may resist the lateral thrust of the pelvis by pressing downward.

In normal ambulation the adductors and internal rotators contract as more weight is put on the supporting limb. The pelvis is shifted laterally outside the limb and rotated to bring the opposite side forward. In prosthetic ambulation the tendency is to bend the trunk over the supporting stump side and to move the pelvis in the opposite direction. This must be strenuously resisted during training. It is very important that the patient obtain a mental picture of the correct method during the dynamic exercises period.

To help increase the patient's confidence in this alignment the following procedure is included. The patient moves forward on the prosthesis with his arms extended overhead. The therapist presses backwards against the hands or arms to prevent excessive forward movement of the trunk. A second therapist pushes laterally against the pelvis on the side of the swing extremity to force the pelvis over the supporting limb. Although the pelvis is actually pushed while in motion and only the prosthetic extremity is in contact with the floor, the knee remains locked (fig. 7). This movement is safe because the knee mechanism is forced to remain locked by the backward movement of the limb and the shifting of the trunk weight obliquely upward and forward. The patient will soon learn to walk in a straight line with proper utilization of his pelvis and lower extremities.

Adduction and Internal Rotation of Extended Stump

Exercise 1: The patient lies in a

Fig. 7 — The pelvis is thrust laterally over the supporting limb — side view.

supine position. A bath towel sling is placed around the stump. The therapist stands near the head of the table on the stump side and firmly grasps the ends of the sling.

Exercise 2: The patient assumes a supine position obliquely across the treatment table with his lower extremities abducted. The unaffected extremity or the longer stump in the case of a bilateral amputee must be clear of the table. Both hips rest on the treatment surface. The therapist stands between the table and abducted limb. He presses his body against the outer limb while at the same time applying force with his hands against the adductor surface of the stump. The therapist checks the position of the pelvis with the other hand (fig. 8).

The patient strenuously adducts and internally rotates the extended stump against the hands of the therapist while adducting the contralateral limb against the body. The force developed in the stump extremity is in direct proportion to the strength utilized by the patient

Fig. 8 — Adduction and internal rotation of the extended stump against the body and hand of the therapist.

in pressing the contralateral extremity against the trunk of the therapist.

Exercise 3: This exercise is dependent on a principle developed in Exercise 2. The patient sits close to the edge of the table with the extremities abducted. The stump rests on the table but the opposite extremity is held clear in an internally rotated position with the knee flexed. The therapist braces his body against the inner aspect of the latter extremity. The patient keeps his arms folded across the chest.

The patient tries to rotate externally and adduct the leg against the therapist who firmly holds his position. The amount of force the patient can exert depends on how well he can stabilize his body. This is accomplished by bracing the stump against the treatment table. It is during this procedure that the stump is adducted, internally rotated and extended. The more the therapist resists the action of the contralateral limb the greater is the effort required by the stump.

Exercises 1, (which is not a dynamic exercise within our definition), and 2 are used only for short stumps, and only for the period when the patient is unable to perform the other exercises of the adductor series. Exercise 3 is a standard dynamic exercise.

Adduction and Internal Rotation of Stump with Oblique Flexion of Trunk

POSITION: The patient assumes a lateral lying position close to the edge of the table with the stump side in contact with the surface. The upper hip is slightly flexed and the foot rests on the table. The arms are folded across the chest. The therapist stands behind patient on a seven-inch stool and with extended arms places his hands on the adductor surface of the stump for stabilization.

OBJECTIVE: The patient adducts his stump against the unyielding stabilization provided by the therapist and simultaneously flexes the trunk obliquely off the table. The stump tends toward internal rotation during this effort (fig. 9).

Fig. 9 — Adduction and internal rotation of the stump with oblique flexion of the trunk.

RESISTANCE VARIATION: The contralateral extremity is free during the exercise but if patient abducts it, oblique flexion of trunk will be difficult if not impossible. The patient should try to keep the foot of this extremity in contact with the table or as close to it as possible. During the early stages the hip of the stump extremity will tend to flex. As progress is made this tendency is minimized. This exercise is very difficult for all amputees regardless of stump length at the beginning, since they invariably fail to utilize their adductors. If the exercise is tried with intact extremities the same difficulty will manifest itself and for the same reason. At the start of the exercise the patient should adduct his stump against the grip of the therapist. As soon as the patient is adducting strenuously it will be seen that the effort tends to start oblique trunk flexion. At this time the patient should try the complete exercise. If the patient flexes his trunk laterally rather than obliquely, the exercise is even more difficult to perform. This exercise is also performed with the below-knee amputee with stabilization applied lower on the thigh.

The accomplishment of this exercise depends on the increasing strength and control of the adductors and their effective use in a coordinating movement. Muscle awareness in this exercise must exist or the exercise will not be effected.

Stump Abduction with Pelvic Elevation

The patient assumes a lateral lying position with the stump side in contact with the treatment table. The stump is adducted and a seven-inch hospital stool is placed under the abductor surface. The opposite limb rests on top of the stump clear of the stool and the table. If the stump is short it will be necessary to substitute towelling in the form of a five-inch roll for the stool. The patient stabilizes his position by bringing the upper arm across the chest so that the forearm and hand are in contact with the treatment table (fig. 10).

Fig. 10 — Stump abduction with pelvic elevation using a foot stool.

The patient abducts the stump against the stool until it is in straight alignment with the pelvis and the trunk.

Resistance Variations

The resistance can be altered by following a procedure similar to that outlined under the exercise for adduction of the internally rotated stump with lateral pelvic thrust.

The stool is moved distally. The range of the pelvic lift is gradually increased. The therapist places his hands under the hip and assists the elevation process. The therapist can apply resistance by pressing downward on the pelvis.

It is not uncommon to find that the shortened muscles in amputees are weak. This observation applies to the abductors of the stump. If the other muscles of the stump are strengthened there can be no objection to include the abductors as well. It is logical to assume that prosthetic ambulation would be more efficient if all the muscles of the stump were in good tonus.

The hip flexors should also be strengthened for the same reason. This can be accomplished during activities for strengthening the abdominal musculature in the conventional manner.

Stump Movements in Response to Disturbance of Sitting Posture

The patient sits in an erect comfortable position on the treatment table or floor mat. His lower extremities are abducted so that maximum stability is obtained. At first the therapist stands on the stump side, or in the case of a bilateral amputation, on the side of the shorter stump. Later the therapist shifts over to the opposite side. The therapist elevates his arms to approximately the patient's shoulder level, with the hands about four to six inches away. The patient may keep his upper extremities in any position providing that the hands do not touch the treatment table (fig. 11). If the floor mat is used the patient keeps his eyes closed.

The therapist attempts to upset the patient by a series of thrusts from all directions against the trunk so that the patient is suddenly pushed or pulled sidewards, forwards or backwards or in any combination of these movements.

The difficulty of maintaining a sitting balance will be directly related to the rapidity and strength of the thrusts.

If the patient tends to lose his balance easily, more time for recovery must be given between thrusts. In addition, the patient may be pushed with less vigor

Fig. 11 — Stump movements in response to disturbance of sitting posture.

and be forewarned of any change in the direction of the thrust. When the patient is able to utilize the stump more efficiently in maintaining balance, the necessary variation in the manner of applying the thrusts may be made.

In this activity the patient must place as much reliance on the involved extremity as on the opposite side or he will be unable to utilize the dynamic equilibrium necessary to maintain the erect sitting position. In all movements of the trunk, the stump extremity responds by internal rotation and extension. However, when the trunk is suddenly pushed backwards or sidewards away from the stump, the immediate surprise reaction is a slight lifting of the stump off the treatment table. With training the response to this is an attempt to "grasp" the plinth with the internal rotators and extensors. Hip flexion is used in the final recovery of trunk balance. It is also obvious that because the basic sitting position is constantly being shifted, there is a fine interplay of the lower extremity and trunk musculature.

Rotation of the Pelvis About the Support Extremity

The amputee assumes an erect standing position with the pelvis rotated so that the hip of the amputation side is behind its opposite member. The patient grasps the back of a chair which

is placed close to the supporting limb. The therapist stands behind the patient and places one hand in front of the hip of the amputation side. He puts his other hand on the opposite shoulder of the amputee.

As the therapist offers resistance, the patient rotates his pelvis until the hips are parallel. The resistance must be minimal or else the patient may lose his balance (fig. 12).

Fig. 12 — Rotation of the pelvis about the support extremity with resistance by the therapist — side view.

It has been observed that many amputees tend to bring the prosthetic leg forward in the swing phase while the pelvis on that side remains posterior to the contralateral hip. As a result, the direction of the prosthetic aide is not directly ahead but obliquely forward. The leg tends to be circumducted as it is moved. Exercise prevents this. The pelvis is rotated on the support extremity before the prosthetic extremity is lifted from the ground. This rotation also encourages flexion of the knee mechanism in preparation for the swing phase.

Below-Knee Exercises

The foregoing exercises described are utilized for below-knee as well as above-knee stumps. In addition, the following activities are employed: 1) The patient kneels on the mat with the hips extended and with the outstretched upper limbs abducted or flexed at shoulder level. The therapist applies sudden thrusts to the distal end of either extended upper limb in an effort to upset the kneeling balance of the patient. The patient extends his stump against the mat when attempts are made to upset his position. The patient therefore learns to use and to depend on the below-knee stump, and 2) the patient kneels with the hips extended and with hands resting on his thighs. The patient rocks back and forth on his knees. Frequent use of this exercise aids in the development of the quadriceps and encourages stump utilization.

Comment

It has been the general policy to utilize exercises individually designed to produce specific effects, such as strengthening of the stump musculature, decreasing stump sensitivity and increasing the general tone of the body. When the prosthesis arrived the patient began his gait training. He spent from one to two weeks in the parallel bars and from six to twelve weeks learning how to walk on all surfaces[9].

The dynamic exercises were designed to incorporate the various effects desired into single integrated movements. Thus, coordination activities are used which strengthen the musculature, decrease sensitivity, increase muscle tone,

correct or prevent contractures, and simulate the motions which take place when using the actual prosthesis. The procedure is also explained to the patient in such a manner to indicate the ultimate carry-over value. The patient is prepared both mentally and physically with resultant full cooperation.

The patient is ready to use his prosthesis when it arrives. Balancing activities require very little time. The parallel bars are used sparingly. Following the dynamic exercises, many amputees begin immediate ambulation outside of the bars holding their arms obliquely upward and forward with the aid of a therapist. The patient is very confident and it is merely a question of perfecting the gait and of learning to walk in the special situations found in daily activities.

This program is especially designed for busy clinics where personnel is relatively scarce[9]. In addition to the amount of time saved the patients quickly learn to do many of the pre-prosthetic activities under nominal supervision and can carry them out at home.

Summary

A series of dynamic exercises which serve to prepare the lower extremity amputee for the use of his prosthesis has been devised. Each exercise has a multiple function. This includes coordination of the stump activity with that of the rest of the body, use of the trunk, pelvis and lower extremities in a similar manner to that employed in actual prosthetic ambulation, lessening of stump sensibility, general increase of muscle tone, maintenance of joint flexibility, and the prevention and correction of contractures.

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The Progress Report of the Baruch Center of Physical Medicine

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In April 1944, the Baruch Committee on Physical Medicine granted $250,000 to the Medical College of Virginia. This was to be expended over a ten year period for research and education in physical medicine with special emphasis on spa therapy, hydrotherapy and climatology. As a result of the grant, the center has been the focus of considerable attention in this special area of medicine.

The Baruch Center of Physical Medicine has produced a large volume of significant basic and clinical research. It has developed one of the finest schools for the teaching of physical therapy and has created an awareness of modern physical medicine and rehabilitation among the physicians of the southern and middle atlantic states. These gains have come about through the efforts of many individuals. Often extenuating circumstances have made the tasks difficult.

At the present time, the Baruch Center is in the process of reorganization and redevelopment. This has become necessary since there was no active director for a ten month period in 1952, during which time the excellent organization that was developed from 1944 to 1951 was dispersed.

A report of the various developmental phases of this center should be of value to other medical centers. Therefore, it is proposed to make this the first of periodic reports to the American Congress of Physical Medicine and Rehabilitation regarding the activities of the Baruch Center of Physical Medicine.

The Environment

The Medical College of Virginia is located in Richmond and is supported by the Commonwealth of Virginia. Included in the college are schools of medicine, dentistry, pharmacy, graduate study, nursing and other paramedical fields. Under the leadership of Dr. William T. Sanger, President of the College, the various schools have been merged into a progressive, well-organized institution.

The hospital division is served by the various clinical departments of the School of Medicine. The 980 beds are distributed according to the financial needs of the patient rather than the type of service to be rendered (exceptions are pediatrics, psychiatry and obstetrics). The beds are located in four hospital areas: 1) Medical College of Virginia Hospital; 2) St. Philips Hospital; 3) Dooley Hospital, and 4) Memorial Hospital otherwise known as the Baruch Center of Physical Medicine. These hospital areas are connected by tunnels.

The treatment areas for the Department of Physical Medicine and Rehabilitation are located in the basement areas of the Baruch Center, Medical College of Virginia Hospital and St. Philips Hospital. The School of Physical Therapy is located on the third floor of the Baruch Center of Physical Medicine.

The Heritage

Dr. Simon Baruch was graduated from the Medical College of Virginia in 1862. With that background, he reached such stature so that he is known today as "The Father of Hydrotherapy in America" and as Dr. Frances A. Hellebrandt points out, he might with equal truth be called "The Father of Rehabilitation" or "The Apostle of General Practice."[1]

Now, as then, the Medical College of Virginia places primary emphasis in its

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medical curriculum on integrated medicine. This is attested to by the Institution's support of residency training for general practice and its strong interest and participation in the development of the Home Care Program[2].

Since the purpose of the college is directed solely to education in the medical disciplines it is not encumbered with the problems characteristic of the general university medical center. This results in more freedom of action. Furthermore, the basic keys to success and continued growth of this medical center have been cooperation and teamwork. Dr. Sanger noted in a conversation "The Medical College of Virginia may not gain national renown in all phases of medicine, but it is a lighthouse for the development of interdepartmental cooperation." Therefore, it would appear that this environment and heritage is particularly well adapted for the development of physical medicine and rehabilitation. Physical therapy had its beginning at this institution in 1935. Until 1944, the Department served as an ancillary function to the hospital division. It was of particular interest to note that there was a significant increase in departmental activity and staff following a visit by Doctors Frank H. Krusen and John S. Coulter in 1940, which was sustained over a two year period. However, by 1944 the physical therapy department consisted of one full time and one part-time physical therapist.

Baruch Center Activities, 1944 to 1951

In 1944, Dr. Frances A. Hellebrandt accepted the position as Director of the Baruch Center of Physical Medicine. In the initial report of the Center, she proposed the development of a loosely knit institute-type organization. From the outset it had three mutually, interlocked functions to perform: 1) To serve the sick through the rational use of physical therapeutic procedures; 2) to contribute to the advancement of human knowledge in the field of physical medicine through systematic, basic and clinical research, and 3) to provide educational facilities for the training of technical personnel in the practice of this branch of medicine.

Pursuant to these ends, the department was organized into semi-autonomous units. The basic research laboratory headed by Dr. Ernst Fischer began operation in July, 1944 and six months later, the applied physics laboratory under the direction of Mr. Clifton B. Cosby was opened. A collegiate type school of physical therapy with a four year curriculum leading to a Bachelor of Science degree was developed in cooperation with the Richmond Professional Institute of the College of William and Mary and the first class was graduated in June, 1946. In September, 1946 the division of clinical research started activities under the direct supervision of Dr. Hellebrandt. The clinical division of the department, headed by Dr. Josephine J. Buchanan, had by the third year through continued, progressive development reached a fairly satisfactory level of offering service to the hospital division.

Throughout these formative years, the most harassing feature hindering the full development and coordination of the Center was the physical separation of the various units and the fact that it was housed in temporary quarters. The factors of national stress resulting from World War II made it impossible to place the Baruch Center in a permanent, consolidated location. In spite of these inherent problems, the organization was able to proceed with highly significant work in research, education and patient care.

These basic features of the organization were accomplished within the first three years. During the following two years, the program continued to expand and grow in all areas. In the fiscal year 1947-48, there was an advance of signal importance—the establishment of the Department of Physical Medicine in the School of Medicine supported by the Commonwealth of Virginia.

The final and major physical goal of the Center was achieved in 1949 with the acquisition of the Memorial Hos-

pital building where the various departmental activities were consolidated. The division of basic research, which had always functioned as an autonomous unit, was transferred to the Department of Physiology where the laboratory continued operation without change in personnel on a grant-in-aid basis. The units transferred to the Memorial Hospital Building included the Clinical Division, the Clinical Research Division and the School of Physical Therapy. Dr. Hellebrandt proposed to develop wards in this building for the establishment of an in-patient service.

The work of the Center can be reviewed best by examination of the bibliography which may be had on request. It will be found that the subjects studied and presented cover an exceedingly broad scope of interest to this special field of medicine. In addition to the published papers, survey work in the form of pilot studies was undertaken in many areas including hydrotherapy, climatology and spa therapy. An extensive bibliography of all known works relative to this field was accumulated.

The Baruch Center under the tutelage of Dr. Hellebrandt had a strong and forceful influence throughout the field of physical medicine. In addition to the activities directed to the institution, she and the staff participated in community, regional and national meetings relative to the area of work. Numerous exhibits, panel discussions, unpublished speeches and visitations were undertaken.

In December, 1951 Dr. Hellebrandt resigned as Director of the organization. With it the activities of the clinical research division terminated. The School of Physical Therapy and the Clinical Division of the Department of Physical Medicine and Rehabilitation continued activities with Dr. Walter J. Lee as the acting director. With the withdrawal of a considerable number of personnel, it was exceedingly difficult to maintain these services at its highest level of effectiveness.

Baruch Center Activities 1952-53

In September, 1952 I accepted the position of Professor and Chairman of the Department of Physical Medicine, Director of the Baruch Center of Physical Medicine and Medical Director of the School of Physical Therapy at the Medical College of Virginia. At that time it was evident that the department would have to undergo complete reorganization to be effective. A survey of the needs of the institution revealed four fundamental areas in which the department could offer services: 1) Development of a low cost, rapid treatment center for cases with residual disability delaying discharge from the various hospital units and for cases not requiring the service of an acute hospital; 2) consultation service for the other departments in the hospital division; 3) teaching of Physical Medicine and Rehabilitation to medical students, physical therapy students, occupational therapy students, nurses, house officers and general physician staff, and 4) a clinical research program with emphasis on hydrotherapy and spa therapy.

Following personal discussions and group meetings with the President of the College, the Dean of the Medical School, the Director of the Hospital Division and others, it was the concerted opinion that the Medical College of Virginia was peculiarly adapted to the development of a special hospital for physical medicine and rehabilitation. Because of the size and nature of this Institution, such an undertaking should be possible utilizing the cooperative efforts of the various departments of the hospital division to meet the needs of the severely disabled and chronically ill. With the development of closer integration with the Woodrow Wilson Rehabilitation Center at Fishersville, Va., and other facilities in the State, it would be possible to establish an adequate discharge plan which would ease the problem of the "frozen bed" in the acute hospital areas.

Therefore, based on recommendations from the Hospital Division and this De-

partment, we have pursued the establishment of the special hospital to be designated the Baruch Center of Physical Medicine. The progress to date has been as follows: 1) Five ward areas in the Memorial Hospital Building have been completed and opened. An additional ward has been proposed and will be readied when funds are available. At the present time the various wards serve as an annex to the other hospital areas. The patients are chosen for admission to these beds when there is an expressed need for treatment by this department. It is the stated plan to incorporate the hundred beds into the Baruch Center of Physical Medicine when staff is available; 2) a hospital administrator, Mr. Stanley Gumerlock, has been appointed for the building. His efforts are now directed toward the establishment of a self-contained, financial unit within the hospital division; 3) the physical therapy section of the department is being expanded to meet the needs of the increasing patient load. At present there are fifteen registered physical therapists in the department with six in supervisory capacities; 4) an occupational therapy section is now being developed as an integral unit of the department. In the past, one therapist was attached to the department, but her activities were directed solely to the cerebral palsy unit which is supported by the Virginia Society for Crippled Children and Adults. Recently the staff has been increased to four and the work of the section is being broadened to the full scope of the field; 5) in September, 1953 the Baruch Center of Physical Medicine opened a full section for audiology training. This is a cooperative effort with the Department of Otolaryngology and Rhinology. The Junior League of Richmond opened a speech training area simultaneously from which services can be secured by the Baruch Center; 6) in October, 1953 Dr. William O'Rourke became a full time staff member of the Department and it is hoped that by January 1, 1954 the physician staff of the department will be complete, and 7) a nurse thoroughly

Figure 1

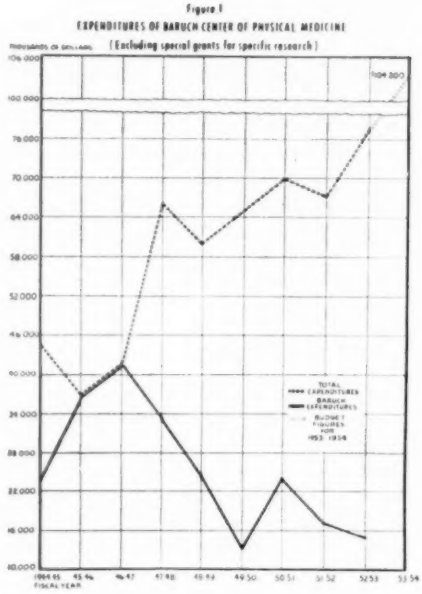
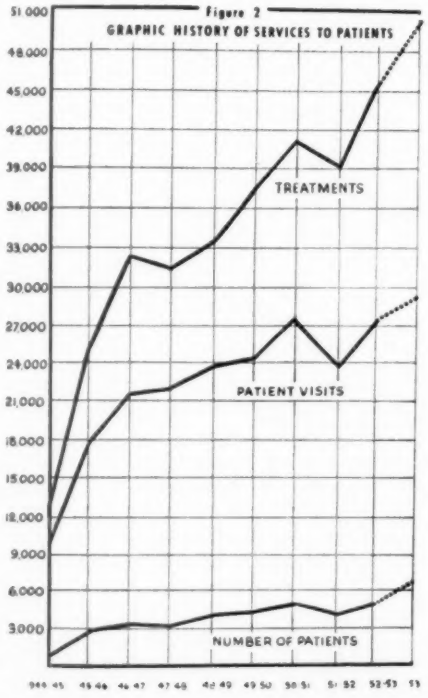


Figure 2



trained in rehabilitation and a recreation supervisor oriented to the needs of a special hospital of this type have been contacted and will join the staff when the Center is ready for full operation.

Clinical Service

As indicated in figure 1, the service to patients has steadily increased since the inauguration of the Baruch Center. During the past year all patients referred to the Department have been seen in consultation and prescriptions for treatment have originated from the physicians on the Staff. Physicians and various agencies referring patients to the Baruch Center on an out-patient basis have received reports regarding the findings and recommendations for treatment. Prior to 1952, consultation services were rendered only when it was specifically requested by the referring physician.

Since 1944, it has been the opinion that the number of patient referrals from the various services in the hospital division have been below average. By participation in ward rounds on the various services, it is hoped that the situation will be remedied.

Teaching

The School of Physical Therapy has been in continuous operation since the fall of 1945. There are now 323 graduates of the school, of which 320 have satisfactorily completed the examination conducted by the American Registry of Physical Therapists.

In the past, teaching in the School was done by a full time staff of registered physical therapists augmented by physicians from this and other departments. Based on past experience, it has been exceedingly difficult to retain physical therapists in a full time teaching capacity for a significant period of time. To remedy this, the clinical and teaching positions have been altered so that all physical therapy supervisors and the chief physical therapist will have teaching responsibilities in the school and those physical therapists principally attached to the school will have clinical duties assigned.

Teaching of Physical Medicine and Rehabilitation in the Schools of Medicine, Nursing, Practical Nursing and Public Health Nursing was undertaken as a continuation of the educational program of the Baruch Center. Plans have been submitted to the Dean of the School of Medicine for expansion of the teaching program to the medical students in each year of school.

During the summer of 1953, six medical students accepted predoctoral fellowships with this department. Two fellowships were supported by the National Foundation for Infantile Paralysis and four were supported by the Baruch Grant. The fellows were given a thorough introduction to this medical specialty by lectures, demonstrations and practical work at the Medical College of Virginia and McGuire VA Hospital in Richmond.

In the area of post-graduate training, the first resident fellow joined the department on July 1, 1953. In addition, two applications for fellowship training have been filed. Therefore, it is hoped that it will be possible to complete the residency staff within the next year.

Research

At the present time, it is not feasible to undertake work in this area because of the limited physician staff. After the in-patient service has been established and the physician staff has reached a satisfactory level, the clinical research program will be re-established. At such a time, the post-graduate study program for physical therapists will be reactivated. Hydrotherapy and spa therapy will continue to be emphasized.

The Baruch Grant

It is indeed interesting to observe how a special grant for education and research has been instrumental in creating an active and sustaining program.

Figure 1 shows the utilization of the Baruch Funds to date as related to the basic departmental budget. Special grants for specific research and subsidies for the training of physical therapy stu-

dents have been excluded from these statistics. In the first year of the Center, the Baruch Grant supported 54 per cent of the basic operation. Since the fiscal year 1947-48, there has been a progressive increase in the support of the Center by the Hospital Division, Medical College of Virginia and the Commonwealth of Virginia so that in the coming year 14.1 per cent of the basic operational budget will be derived from the grant.

The Baruch Funds have been utilized in supporting salaries for those members of the department actively engaged in teaching and/or research, development of the School of Physical Therapy, purchasing research equipment, participation in scientific meetings and predoctoral fellowship programs.

Summary

The history of the development of the Baruch Center of Physical Medicine at the Medical College of Virginia Hospital has been reported.

On first consideration it would appear unfortunate that a lapse in continuity of leadership of the center occurred. However, a more timely study shows the temporary retardation of activities in 1952 served only to clarify the need and provide additional impetus for the continued development of this special area of medicine at the institution.

The general purpose and direction of the activities of the Baruch Center are following along lines similar to those envisioned by Dr. Hellebrandt. The methods of approach and the type of organization differ.

We trust that our efforts at the Medical College of Virginia will prove to be a compliment to Mr. Bernard Baruch and the field of Physical Medicine and Rehabilitation.

References

1. Hellebrandt, F. A.: "Commemorating the 110th Birthday of Simon Baruch." Special Bulletin of the Baruch Center of Physical Medicine, July, 1950.
2. Holmes, E. M.; Nelson, K., and Harper, C. L., Jr.: The Richmond Home Medical Care Program. Am. J. Pub. Health 43:115 (May) 1953.

A complete listing of Baruch Center Publications for the period July 1944 through June 1953 may be had on request. Those persons interested in securing this information should write direct to Herbert W. Park, M.D., Department of Physical Medicine, Medical College of Virginia, 1200 E. Broad St., Box 846, Richmond 19, Va.

IMPORTANT ANNOUNCEMENT

AMERICAN BOARD OF PHYSICAL MEDICINE AND REHABILITATION

The next examinations for the American Board of Physical Medicine and Rehabilitation will be held in Philadelphia, June 5 and 6, 1955. The final date for filing applications is March 1, 1955. Applications for eligibility to the examinations should be mailed to the Secretary, Dr. Earl C. Elkins, 30 N. Michigan Ave., Chicago 2.

A Functional Handsplint for the Cerebral Palsied Child

S. Malvern Dorinson, M.D.
Patricia McLaughlin, O.T.R.
and
Mary Markus, A.R.P.T.
San Francisco

One of the most common problems found in the physical treatment of cerebral palsied children is the poor use of their hands. A major method of teaching hand control has been the use of hand braces or hand splints. Over a period of years there have been numerous types of such devices made, with each clinic seeming to prefer its own. This has resulted in the development of many varieties of metal, plastic, plaster-of-Paris casts, and leather gauntlets. Most of these splints had many disadvantages, among them being the labor and expense of fabricating them, plus the inability to secure a proper fit. However, the major disadvantage was that these splints actually restricted motion and allowed for no functional activity while being worn. In this way, they actually prevented the functional training of a hand involved by cerebral palsy.

To be a practical instrument in a busy clinic handling such children, a handsplint must (1) be easily fitted; (2) be easily made [usually by the occupational therapist]; (3) break up unwanted patterns of movement, and (4) still be functional in that the child can use his hand while wearing the splint. After much experimentation, we have found the most suitable material to be Aire-Cast®, which is readily available from any medical supply house. This material is sometimes used in setting of bone fractures. It has the advantage of being light, easily molded, and quick setting. These splints are placed on the dorsum of the hand and wrist in order to maintain the hand in proper functional position and yet leave the palm and the fingers free for grasp and release. The simplicity of materials used, plus their ease of handling and fitting, makes it possible for an occupational therapist to make a complete splint in less than one hour's working time.

Materials needed are ordinary stockinette, Aire-Cast®, talcum powder, acetone, horsehide leather, webbing, small buckles, clips, grippers and Speedec® Rivets. The splint is then made according to the following steps:

1. Cut enough stockinette to extend from the metacarpophalangeal joints to the proximal one-third of the forearm. The stockinette is removed, impregnated with talcum powder and replaced on the patient's hand and forearm like a glove, with a hole cut for the thumb.
2. Cut six or eight strips of Aire-Cast® the same length as the stockinette. Using pliers or forceps, insert the Aire-Cast®, one strip at a time, into the setting fluid for about ten seconds. Then place this wet strip on the dorsum of the forearm, the first strip going down the center and the second, third, fourth, etc., put on alternating sides, making certain that the last one is placed again down the middle.
3. Holding the hand and arm of the child in the desired position, the therapist uses her other hand to guide a hairdryer blowing a stream of hot air on the moistened strips of Aire-Cast® until it is almost set. Assistance from another person to hold hand and arm is sometimes needed when involvement is quite severe.
4. Remove this partially-set splint from the child and use the dryer on the under side. The edges are then trimmed to shape and put on the arm once again to check for correct fitting.
5. Line the splint with clean horsehide leather leaving ⅜ inch overlap around the margin in order to cement the leather over the edge. This can be done with ordinary rubber cement.
6. Cut three strips of ⅝ inch webbing to desired lengths for straps. Attach two-prong safety buckles on the radial side of the splint.
7. With Speedee Rivets® attach the buckle end of the webbing at the edge of the splint. Usually only three straps are necessary—one to go over the dorsum of the hand and around the palm at approximately the palmar crease of the hand. This should be placed at a slanted direction to correspond with the slant of the palmar crease of the hand. The other two straps are placed at the wrist and at the mid-forearm. Rivet the straps down on the other edge of the splint. The amount of "cockup" at the wrist should be made while the Aire-Cast® is still wet.
8. The splints can be painted with lacquer in different colors to aid in keeping the splints clean and also to give them some distinctive appearance if the child desires. If there is an extreme amount of tension or spasticity in the palmar flexors, it may be necessary to reinforce the splint. This can be done in several ways. First, coathanger wire may be incorporated along the edge of the splint for a stiffening agent. Another method is to take a piece of aluminum possibly one inch wide and one-eighth inch thick and incorporate it along the center of the dorsum of the splint. Another method is to take strips of wire mesh such as is used in stucco work and cut it to size and shape and incorporate this in the cast between the strips of Aire-Cast®.

One cannot appreciate the need and value and use of such handsplints in

the training of cerebral palsied children without looking closely at the type of disabilities to be found in such children. Beginning with the child in early infancy, the usual picture is that of a clenched fist with the thumb tucked underneath the other fingers. As soon as some measure of finger control is developed, the child learns to drop the wrist into the palmar flexion to allow the fist to open passively by extension of the fingers, and this brings on several poor skills. There is a weak grip; a tendency to drop things, and poor opposition producing an inability to pick up and hold small objects. It makes fine skills, such as tying and buttoning, holding a pencil, all quite clumsy. In some children, particularly in the spastic group, if this position of palmar flexion is allowed to be maintained over a period of years, permanent contractures occur in the long flexor tendons of both the wrist and the fingers. This complicates further use of the hand. The splint also prevents ulnar deviation, which is the natural pattern when the wrist is allowed to go into palmar flexion.

To eliminate both the drop wrist and the deviation, the first splint is usually placed in the neutral position, midway between wrist flexion and extension, though occasionally there may be some slight dorsiflexion. In no instance should the first splint be put up in full dorsiflexion, since this amount of correction is too severe and prevents any functional activity of the hand. The hand is then strapped in the splint. Since no strap can hold a hand in a fixed position, there is usually from 5 to 15 degrees play in the wrist position. Nevertheless, it serves the purpose of training a pattern of finger extension which is separate from wrist motion. In other words, the wrist is maintained in a relatively still position while the fingers are taught to open and close.

An important part of the splint which should be properly placed is the thumb strap. This is either a simple leather or webbing strap, which is looped around the base of the thumb to pull it out

Fig. 1 — Dorsal handsplint with thumb cuff to keep thumb extended.

of the fist and literally keep it out of the way while the child is being taught flexion and extension of the long fingers. One of the most common pictures seen is that when the child is asked to close his fist, the thumb flexes first and literally touches the palm before the long fingers, and therefore is tucked underneath them when the full fist is made. This is non-functional. By holding back the thumb with a strap, the other fingers come to form the grasping fist before the thumb can interfere. After a suitable period of time, the thumb strap may be released, and the normal pattern of making a fist will remain. Another advantage of a thumb strap is that by holding the thumb in some extension, the flexion reflex is broken and the child is able to open his fingers more easily. In our clinical experience the thumb in flexion is the trigger which maintains the other fingers in flexion, and when this trigger is released, the other fingers can be released for active extension. As the thumb strap fits around the base of the thumb there still may be a tremendous pull in the long flexor of the thumb. It has sometimes been found necessary to make a small leather cuff

to fit around the thumb, and to this is attached the strap pulling the thumb out into extension (fig. 1). It should be stressed that the thumb should not be pulled into the functional position of abduction, but rather into extension, since it is the mass flexion movements of the fingers that we are trying to eliminate.

In our experience these splints have been extremely helpful in teaching some finger and hand motion as a preliminary, and also as a simultaneous adjunct to handskill activities. These have been found to be useful, both in the spastic and in the athetoid children. These splints are placed on children as young as one year of age, since such early use makes the hand more pliable and under better voluntary control when the child becomes old enough to profit from supervised training. As stated before, these splints are kept on during the entire day, being worn not only in therapy but during play activities and particularly in school for hand activities, such as writing, drawing, eating, etc. The splints are to be worn at home after the parents have been instructed in their use.

During the past eighteen months these splints have been found to be extremely durable. They are seldom broken and require replacement only when the child outgrows them.

WE WANT TO KNOW ABOUT YOU —

your activities, local and national, are of interest to us. ***Remember, what may not be news to you is news to others.*** Please send all information before the 15th of the month. The news blank is for your convenience — **send it in today!**

— MEMBERSHIP NEWS —

Archives of Physical Medicine and Rehabilitation

Who?

What?

Where?

When?

Why?

MEDICAL NEWS

Members are invited to send to this office items of news of general interest, for example, those relating to society activities, new hospitals, education, etc. Programs should be received at least six weeks before the date of meeting.

PERSONALS

Ray Piaskoski, Milwaukee, presented a demonstration entitled "Meeting the Needs of the Amputee" at the annual meeting, State Medical Society of Wisconsin, held in Milwaukee, October 4-6, 1954. — An address on the topic of rehabilitation was given by **Josephine J. Buchanan**, Arlington, Va., at the annual meeting of the Ohio Society for Crippled Children, Deshler-Hilton Hotel, Columbus, Ohio, October 10. — At the annual session of The Medical Society of the State of Pennsylvania, October 17-22, **Murray B. Ferderber**, Pittsburgh, spoke on the subject "The Role of Nutrition in Geriatric Restoration." — **John H. Aldes**, Los Angeles, appeared on "Ask the Doctor" TV Program. His topic was "Employment of Physically Handicapped." — At the annual session of The Medical Society of the State of Pennsylvania, October 17-22, **Grace M. Roth**, Rochester, Minn., participated in the Symposium on Tobacco by delivering the topic "The Effects of Smoking and of Nicotine on the Cardiovascular System of Normal Persons and Patients with Hypertensions." — The Danish Association of Physical Medicine elected **Sidney Licht**, New Haven, Conn., an honorary member earlier this year. — A joint meeting of the Iowa Chapters of Physical and Occupational Therapists, held at the VA Hospital, Iowa City, September 18, was addressed by **W. D. Paul** on the subject "Poliomyelitis." **David M. Paul** addressed the group on "Upper Extremity Pain Syndromes." — **Frank H. Krusen**, Rochester, Minn., took part in the dedication of the Mayo Memorial Building on October 21-22 on the Minneapolis campus of the University of Minnesota. — The third medical conference of the Muscular Dystrophy Associations of America convened in New York on October 8-9. **Arthur S. Abramson**, New York City, was chairman of the symposium "M.D.A.A. Chapters and the Patient Service Program." — At the annual meeting of the Iowa Academy of General Practice, to be held at the Hotel Savery, Des Moines, May 19, 1955, **Joseph G. Benton**, New York City, will present the topic "Rehabilitation of the Patient with Cardiovascular Disease—An Increasing Community Responsibility." — **Robert M. Stecher**, Cleveland, presented the Heberden oration entitled "Heberden's Nodes" at the Post-Graduate Medical School of London, September 24. — At the International Gerontological Congress held in London, **Michael M. Dacso**, New York City, delivered a paper entitled "Changes in the Circulation of the Hemiplegic Extremities—An Experimental and Clinical Study." Dr. Dacso also visited rehabilitation and geriatric facilities in England, France and Switzerland. — **Louis B. Newman**, Chicago, addressed the Multiple Sclerosis Foundation of America, held at the Spaulding School in Chicago. His subject was "The Role of Physical Medicine and Rehabilitation in Multiple Sclerosis." — At the annual meeting of physicians of the Second Councilor District, held in Dayton, Ohio, October 1, **Leo Rosenberg** presented a clinical demonstration on "Mobilization of the Severely Disabled Patient." **Herman J. Bearzy** was Program Chairman. **A. B. C. Knudson**, Washington, D. C., spoke on "Dynamic Rehabilitation of the Crippled and Disabled." — The Section on Physical Medicine and Rehabilitation of the Ohio State Medical Association elected Herman J. Bearzy as its chairman and **Harry T. Zankel** as secretary. — **Arthur L. Watkins**, Boston, presented the topic "The Hemiplegic" as part of the Medical Seminar, given by the National Society for Crippled Children and Adults, Hotel Statler, Nov. 2-6, 1954, at Boston. Dr. Howard A. Rusk spoke on "Crippled People in a Crippled World" at the same meeting. — The paper "Spontaneous Arteriosclerosis in Epinephrine-Thyroxine and in Cholesterol Induced Arteriopathy" by **Y. T. Oester**, Chicago, and co-authors was read by title at the eighth annual meeting of the American Society for the Study of Arteriosclerosis, held at the Sheraton Hotel, Chicago, October 31-November 1, 1954. — **Hans J. Behrend**, New York City, was appointed consultant in physical medicine at Long Island University College of Podiatry; he was also appointed Attending in Physical

Medicine at the Hospital of Joint Diseases, New York City. Dr. Behrend read a paper entitled "Ultrasonic Therapy in Geriatrics" at the fourth International Medical Congress on Ultrasonics in Amsterdam, Holland in July of this year.

APPARATUS ACCEPTED

The following information relative to apparatus accepted by the Council on Physical Medicine and Rehabilitation of The American Medical Association is reprinted, with permission, from the following issues of The Journal of The American Medical Association: September 4, September 11, September 18 and October 2, 1954.

Acousticon Hearing Aid, Model A-300: Dictograph Products Inc., 95-25 149th St., Jamaica 35, Long Island, N. Y.

The Acousticon Hearing Aid, Model A-300, contains one transistor and two vacuum tubes and is powered by a mercury type A-battery and a 22.5 volt B-battery.

The body of the instrument measures 80 by 60 by 22 mm. and weighs 121 gm. With earphone, receiver cord, A-battery and B-battery, the total weight is 165 gm.

Teca Portable Low Volt Generator, Model SP-2: Teca Corporation, 139 E. 23rd St., New York 10.

The Teca Portable Low Volt Generator, Model SP-2, provides a source of electric current for stimulating normally innervated muscle, for stimulating muscle with damaged nerve supply, for testing with respect to the reaction of degeneration, and for ion transfer. The output is either a continuous direct current or an alternating current. The latter consists of square waves at frequencies up to 2,000 per second; these can be amplitude-modulated at the rate of 6 to 60 surges per minute.

The apparatus is housed in a case with a carrying handle and a sloping front; it measures 26 (height) by 40 by 29 cm. (10 by 15½ by 11½ in.) and weighs 8.6 kg. (19 lb.). Packed for shipment it measures 30 by 45 by 35 cm. (12 by 18 by 14 in.) and weighs 10 kg. (22 lb.). It requires 60 cycle alternating current at 110 volts and draws 30 watts.

Beltone Hearing Aid, Concerto Model: Beltone Hearing Aid Company, 2900 W. 36th St., Chicago 32.

The Beltone Hearing Aid, Concerto Model, is a tubeless hearing aid that contains three transistors and requires one 1.25 volt mercury cell. The on-off switch and volume control are on one dial; the tone control is operated by a lever that has two settings.

The Concerto line includes: Green Dot, Yellow Dot, Red Dot, Black Dot, and Double Black Dot Models.

The body of the instrument measures 72 by 53 by 16 mm. and weighs 80 gm. The earphone weighs 8 gm., the receiver cord 2 gm., and the battery 12 gm., making the total weight 102 gm.

Sonotone Hearing Aid, Model 988: Sonotone Corporation, Box 200, Elmsford, N. Y.

The Sonotone Hearing Aid, Model 988, is an electrical instrument containing three vacuum tubes and powered by one 1.25 volt A-battery and one 15 volt B-battery. It has volume and tone control and receivers for both air and bone conduction. The body of the instrument measures 76 by 44 by 16 mm. and weighs 68 gm. The batteries, earphone and receiver cord weigh 24.3, 7.7, and 2.8 gm., respectively, making the total weight 103 gm.

Hague Cataract Lamp, Model 395: American Optical Company (Instrument Division), Box A, Buffalo 15.

The Hague Cataract Lamp, Model 395 (also referred to as the A. O. Hague Cataract Lamp) is designed to utilize, for diagnostic purposes, a band of ultraviolet radiation that adjoins the violet portion of the visible spectrum. If the lamp is lighted five to seven minutes before use, so as to reach equilibrium, it gives strong radiation around 375 mμ. Shorter wavelengths are absorbed by a special glass filter.

Transmitted wavelengths give fluorescence in the lens of the eye. Radiation from this lamp will also bring about fluorescence in merbromin, fluorescein, thimerosal, riboflavin, quinine sulfate, skin, fingernails, and normal tooth substance.

The apparatus requires 60 cycle alternating current at 120 volts and draws 100 watts. It is equipped with a handle and is connected by a cable to the transformer. The lamp and cord weigh 1 kg. (2 lb. 3 oz.); the transformer weighs 5.1 kg. (11 lb. 7 oz.). Packed for shipment the entire assembly measures 46 by 43 by 33 cm. (18 by 17 by 13 in.) and weighs 9.5 kg. (21 lb.).

Audivox Audiometer, Model 7B: Audivox, Inc. (Successor to Western Electric Hearing Aid Division), 123 Worcester St., Boston 18.

The Audivox Audiometer, Model 7B, is a pure tone audiometer for diagnostic purposes, which is available either as a portable (7BP) or as a desk (7BD) model. Packed for shipment it measures 42 by 48 by 29 cm. (16½ by 19 by 11¼ in.) and weighs 12.3 kg. (27 lb. 4 oz.). The shipping weight includes the following accessories: double headband, power cord, audiogram cards, spare fuse, matched phones, air receiver cords, instruction manual, and wrench kit. The following accessories are not included in the shipping weight: microphone, bone conduction receiver and cord, and adapter for bone receiver.

The instrument measures 30.5 by 41 by 20 cm. (12 by 16 by 8 in.) and weighs 9.6 kg. (21 lb. 4 oz.) It requires 60 cycle alternating current at either 110 to 120 volts or

220 to 240 volts; the power consumption is 35 watts.

Burns Rocking Bed, Model V-3: C. A. Burns, P. O. Box 1020, Denton, Texas.

The Burns Rocking Bed, Model V-3, is intended to provide artificial respiration for patients with partial paralysis of the respiratory musculature. The frequency of oscillation is adjustable from 13 to 30 oscillations per minute. The amplitude of oscillation, which also is adjustable, can be made as great as 27 degrees, while the mean position can be either a positive or a negative angle; that is, the patient's head can be higher than his feet most of the time or lower than his feet most of the time.

Crated for shipment, the bed measures 81 (height) by 198 by 96 cm. (32 by 78 by 38 in.) and weighs 136 kg. (300 lb.). The motor requires 60 cycle alternating current at 110 volts and draws 270 watts.

Paust Electronic Stimulator, Model 50-C: Paust Manufacturing Co., 6011 Ridge Ave., Chicago 26.

The Paust Electronic Stimulator, Model 50-C, is a generator of low voltage currents that stimulates the contraction of normally innervated voluntary muscles. It is small and light enough to be carried about and set on a table. When the case is closed, it measures 34 (height) by 27 by 23 cm. (13¼ by 10¾ by 9 in.) and weighs 6.2 kg. (14 lb.). When the case is opened by removing the front, the slanting control panel is exposed. The apparatus requires a source of 60 cycle alternating current at 110 to 125 volts and draws 20 watts.

The control panel has two jacks marked "No. 1 Patient Circuit" and "No. 2 Patient Circuit." Between them is a switch marked "Circuit Control," which is so connected that in one position it causes the two patient circuits to operate simultaneously, whereas in the other position it causes them to alternate. For each of the two patient circuits a separate "Intensity Control" in the form of a dial is provided. In addition, there is a frequency control, a seconds-time control, a timer, a monitor light, and a place for a fuse.

Unex Hearing Aid, Model TR-3D: Nichols and Clark, Inc., Hathorne, Mass.

The Unex Hearing Aid, Model TR-3D, is a tubeless instrument that contains three transistors and uses one 1.25 volt cell, referred to as an "energy capsule." The body of the instrument measures 54 by 41 by 14 mm. and weighs 37.3 gm. The battery weighs 3.6 gm., the earphone 7.7 gm., and the receiver cord 2 gm., making the total weight 50.6 gm.

The volume control is combined with the on-off switch; there is no tone control. The tone and power performance can be modified by choosing from eight possible receivers.

Panacoustic Pure Tone Screening Audiometer, Model A-500: U. S. Recording Co., 1121 Vermont Ave., N. W., Washington 5, D. C.

The Panacoustic Audiometer, Model A-500, is a pure tone screening audiometer. It is intended to meet the need for a small desk top instrument to test a subject's pure tone hearing loss as a function of frequency within the accepted range for screening devices of this type. The frequency selecting dial enables the operator to choose 500, 1,000, 2,000, 3,000, 4,000, or 6,000 cps. The output dial is graduated to read directly in decibels of hearing loss, with detented steps of 5 db. per step and a range from —10 to +70 db. with respect to average normal threshold.

The instrument requires 60 cycle alternating current at 110 to 115 volts and draws 20 watts. Unpacked it measures 27 (height) by 26 by 14 cm. (10¾ by 10¼ by 5½ in.) and weighs 5 kg. (11 lb. 3 oz.). Packed for shipment it measures 40 by 33 by 19 cm. (16½ by 13 by 7½ in.) and weighs 8.2 kg. (18¼ lb.). The shipping weight includes a standard diagnostic air conduction receiver (earphone), dummy receiver, and a pad of blank audiogram charts. The complete equipment is housed in a carrying case.

Acousticon Hearing Aid, Model A-330: Dictograph Products Inc., 95-25 149th St., Jamaica 35, Long Island, N. Y.

The Acousticon Hearing Aid, Model A-330, is a tubeless instrument that contains three transistors. Its power supply is a 1.25 volt mercury cell which weighs 4 gm. The body of the instrument measures 63 by 44 by 20 mm. and weighs 68 gm. The earphone weighs 10 gm. and the receiver cord 2 gm., making the total weight 84 gm.

Acousticon Hearing Aid, Model A-335: Dictograph Products Inc., 95-25 149th St., Jamaica 35, Long Island, N. Y.

The Acousticon Hearing Aid, Model A-335, is a tubeless instrument incorporating three transistors. Variation of the acoustic gain is adjusted by choosing from among five possible batteries: 1.25 volts, 22.8 gm; 2.5 volts, 26.3 gm.; 4 volts, 13.5 gm.; 5.2 volts, 17 gm.; and 6.5 volts, 20.3 gm. Like several other makes of hearing aids, this model also uses a circuit utilizing transistors that lend themselves to this simple way of adjusting the power of the instrument.

The body of the instrument measures 78 by 44 by 22 mm. and weighs 80 gm. without batteries. The earphone weighs 10.4 gm. and the receiver cord 2 gm., making the total weight between 105.9 and 118.7 gm., depending on the battery.

Dvorine Pseudo-Isochromatic Plates, Second Edition: Israel Dvorine, O.D., 2328 Eutaw Pl., Baltimore 17.

The Dvorine Pseudo-Isochromatic Plates, second edition, designed as a test for color blindness, are contained in a looseleaf binder and arranged in two sections. Section 1 contains one demonstration plate (the numeral 48 in red dots on a background of the blue

dots) and 14 plates made up of several color combinations. Section 2 contains one demonstration plate (a trail of blue dots on a background of red dots) and seven plates featuring trails instead of digits. Each of these plates consists of different color combinations. The second section can be used in testing preschool children and illiterate adults. The plates are not intended for the broad study or individual diagnosis of peculiarities of color vision but for the quick detection of a particular, common defect in red-green discrimination.

The binder fits into a box measuring 18 by 18.5 by 3.5 cm. (7¼ by 7½ by 1½ in.). The shipping weight is 560 gm. (1¼ lb.).

RECENT PUBLICATIONS BY MEMBERS

Y. T. Oester, "Certain Antibiotic Hazards." The Illinois Medical Journal, September, 1954.

Louis B. Newman, with co-author, "Total Rehabilitation of the Cardiac Patient." The Illinois Medical Journal, September, 1954.

Eugene Moskowitz, "Musculoskeletal Disorders Simulating Poliomyelitis." The Journal of Pediatrics, July, 1954.

Odon F. von Werssowetz, "Braces for the Lower Extremity in Poliomyelitis." The Physical Therapy Review, September, 1954.

Donald A. Covalt, "New Hope for the Disabled Through Rehabilitation." Department of Medicine and Surgery Information Bulletin, July, 1954.

Louis N. Rudin, with co-author, "Mechanical Hip Extensor." Journal of The American Medical Association, September 4, 1954.

George Morris Piersol, "The Role of the Consultant in Rehabilitation in the Veterans Administration." Department of Medicine and Surgery Information Bulletin, July, 1954.

Jerome W. Gersten, with co-author, "Changes in Phospho-creatine Produced in Striated Muscle by Ultrasound." American Journal of Physical Medicine, August, 1954.

Robert L. Bennett, "Resumption of Activity Following Poliomyelitis." The Journal of the Medical Association of Georgia, August, 1954.

Nila Kirkpatrick Covalt, "Sauna Baths — A Preliminary Report." American Journal of Physical Medicine, August, 1954.

Charles Long II; Michael M. Dacso, and Howard A. Rusk, "Rehabilitation of the Hemiplegic Amputee." Journal of The American Medical Association, August 21, 1954.

W. D. Paul, with co-authors, "Intravenous Procaine in the Therapy of Acute Poliomyelitis." American Journal of Physical Medicine, August, 1954.

W. A. Selle, with co-authors, "Special Review. Some Physiological Aspects of Joints in Health and Disease: Part II. Physiology of Abnormal Joints." American Journal of Physical Medicine, August, 1954.

George W. Geiss, with co-authors, "Adapted Two Harness Table Loom." The American Journal of Occupational Therapy, Sept.-Oct. 1954.

Edward B. Shires, with co-authors, "Hypnosis in Neuromuscular Re-Education." U. S. Armed Forces Medical Journal, October, 1954.

BOOKS RECEIVED

Books received are acknowledged in this column as full return for the courtesy of the senders. Reviews will be published in future issues of the journal. Books listed are not available for lending.

Acute Renal Failure by Arthur Grollman; Charles C Thomas, Springfield, Ill.

The Dynamics of Virus and Rickettsial Infections by Frank Hartman; Frank Horsfall, Jr., and John G. Kidd; The Blakiston Company, Inc., New York.

Eat, Think, and Be Slender by Leonid Kotkin; Hawthorne Books, Inc., New York.

Physiological Aspects of Betatron Therapy by John S. Laughlin; Charles C Thomas, Springfield, Ill.

Wine As Food and Medicine by Salvatore P. Lucia; The Blakiston Company, Inc., New York.

Carcinoma of the Colon by Leland S. McKittrick and Frank C. Wheelock, Jr.; Charles C Thomas, Springfield, Ill.

The Care of the Aged by Malford W. Thewlis; The C. V. Mosby Company, St. Louis, Mo.

True Adventures of Doctors by Rhoda Truax; Little, Brown & Company, Boston, Mass.

Ultrasonic and Ultrashort Waves in Medicine by Johanna M. Van Went; The Elsevier Press, Houston, Texas.

Antibiotics Annual, 1953-1954; Proceedings of the Symposium on Antibiotics, Oct. 28, 29 and 30, 1953, Washington, D. C., by Henry Welch; Medical Encyclopedia, Inc., New York.

Tissue Culture: The Growth and Differentiation of Normal Tissues in Artificial Media by E. N. Willmer; John Wiley & Sons, Inc., New York.

Proceedings of the Annual Meeting — Council for High Blood Pressure Research, American Heart Association, Cleveland, Ohio, May 15-16, 1953; American Heart Association, New York.

How to Help Older People: A Guide for You and Your Family by Julietta K. Arthur; J. B. Lippincott Company, Philadelphia.

Acute Anuria: A Study Based on Renal Function Tests and Aspiration Biopsy of the Kidney by Claus Brun; Ejnar Munksgaard, Copenhagen, Denmark.

The Science Book of Wonder Drugs by

Donald G. Cooley; Franklin Watts, Inc., New York.

Chemotherapy of Infections by H. O. J. Collier; John Wiley & Sons, Inc., New York.

The Painful Phantom: Psychology, Physiology and Treatment by Lawrence C. Kolb; Charles C Thomas, Springfield, Ill.

Emotions and Reason by V. J. McGill; Charles C Thomas, Springfield, Ill.

Problems of Aging: Transactions of the 15th Conference, Jan. 20, 21, and 22, 1953 edited by Nathan W. Shock; Josiah Macy, Jr., Foundation, Packanack Lake, N.J.

Social Science in Medicine by Leo W. Simmons and Harold G. Wolff; Russell Sage Foundation, New York.

Arthritis and Rheumatism: The Diseases and Their Treatment by Charles L. Steinberg; Springer Publishing Co., Inc., New York.

Betty Lee: Care of Handicapped Children by Charlotte D. Tucker; The Macmillan Company, New York.

Cancer: Diagnosis, Treatment and Prognosis by Lauren V. Ackerman and Juan A. del Regato; C. V. Mosby Company, St. Louis, Mo.

Kinderorthopadie by Rupprecht Bernbeck; Georg Thieme Verlag, Stuttgart O, Germany.

Fundamentals of Neuropathology by William Brooks Dublin; Charles C Thomas, Springfield, Ill.

Human Factors in Equipment Design edited by W. F. Floyd and A. T. Welford; John de Graff, Inc., New York.

Symposium on Fatigue by W. F. Floyd and A. T. Welford; John de Graff, Inc., New York.

Human Physiology — 2nd edition by Bernardo A. Houssay; McGraw-Hill Book Co., Inc., New York.

Resection-Reconstruction of the Hip: Arthroplasty with an Acrylic Prosthesis by Jean Judet, et al; Williams & Wilkins Co., Baltimore, Md.

Funktionelle Atmungstherapie by Julius Parow; Georg Thieme Verlag, Stuttgart O, Germany.

The Fundamentals of X-Ray and Radium Physics by Joseph Selman; Charles C Thomas, Springfield, Ill.

Physical Therapy After Amputation by Margaret Bryce; University of Wisconsin Press, Madison, Wis.

Textbook of Bacteriology — 3rd edition by Joseph M. Dougherty and Anthony J. Lamberti; C. V. Mosby Company, St. Louis, Mo.

Medical Uses of Cortisone by Francis D. W. Lukens; The Blakiston Co., Inc., New York.

Diseases of the Skin — 8th edition by Oliver S. Ormsby and Hamilton Montgomery; Lea & Febiger, Philadelphia.

Principles of Occupational Therapy — 2nd edition by Helen S. Willard and Clare S. Spackman; J. B. Lippincott Co., Philadelphia.

Laboratory Experiments in Physiology — 5th edition by W. D. Zoethout; C. V. Mosby Company, St. Louis, Mo.

Cold Spring Harbor Symposia on Quantitative Biology. Vol. XVIII: Viruses; Biological Laboratory, Cold Spring Harbor, L.I., N.Y.

SMITHSONIAN INSTITUTION EXHIBITS BURDICK ELECTROCARDIOGRAPH

Upon invitation from the Smithsonian Institution, The Burdick Corporation of Milton, Wisconsin, has presented an exhibit depicting the workings of a modern electrocardiograph. The exhibit contains Burdick's model EK-7 electrocardiograph enclosed in plexiglass instead of metal so that all controls and components can be viewed from any angle with the aid of a mirror back-drop. This will be part of a new Smithsonian exhibit on the evolution of the electrocardiograph, prepared for first viewing during the World Congress of Cardiology in Washington, D. C. It will remain in the Smithsonian Institution as a permanent exhibit.

NFIP FELLOWSHIPS

The National Foundation for Infantile Paralysis announces the availability of clinical fellowships in the following fields: physical medicine and rehabilitation; management of poliomyelitis, and rehabilitation. The following stipulations have been made:

Physical Medicine and Rehabilitation—Offered to physicians who wish to become eligible for certification by the American Board of Physical Medicine and Rehabilitation. Each applicant must arrange his own program of study, which will meet the requirements of the Board. Each recipient of a fellowship must agree to practice as a specialist in the field in the United States or its territories for at least two years following the completion of the fellowship. Applicants must be physicians licensed to practice medicine in one or more states who have been graduated from an approved school of medicine, have completed an internship of not less than one year in an approved hospital, are U. S. citizens and in sound health. Stipends range from $300 to $400 per month, depending on marital status and number of dependents. Appointments are made for periods of one, two or three years of clinical study, depending on length of time required by applicant to prepare himself for certification by the Board.

Rehabilitation—Offered to physicians interested in rehabilitation as it relates to their particular specialties. Purpose is to provide an opportunity for physicians to

study the concept and basic technics of total rehabilitation. Applicants are eligible if they have been graduated from an approved school of medicine, have completed not less than one year of internship and one year of approved resident training in one of the medical specialties in an approved hospital, are licensed to practice medicine in one or more states, are U. S. citizens and are in sound health. Length of fellowship—Three months to one year. Stipends—From $300 to $400 per month, depending on marital status and number of dependents.

Management of Poliomyelitis—Purpose is to train physicians in the various aspects of the total care of the poliomyelitis patient. Applicants must be U. S. citizens and must have completed at least one year of internship in a hospital approved by the Council on Medical Education and Hospitals of the AMA. Stipends—From $300 to $400 per month, depending on marital status and number of dependents. For application forms and further information, write the National Foundation for Infantile Paralysis, Division of Professional Education, 120 Broadway, New York 5, N.Y.

SOUTHERN MEDICAL ASSOCIATION MEETS

At the forty-eighth annual meeting of the Southern Medical Association, held in St. Louis, Mo., November 8-11, 1954, the Section on Physical Medicine and Rehabilitation presented the following papers: "Clinical Studies of Hemiplegia with Special Emphasis on Shoulder Problem" by Edward M. Krusen, Jr.; "What Is a Rehabilitation Center" by Robert L. Bennett. Discussion of this paper was opened by George D. Wilson; "Accruing Advantages of Modern Planning in Physical Medicine and Rehabilitation" by A.B.C. Knudson. Discussion opened by Israel Muss; "Rehabilitation of the Hemiplegic Patient: A Clinical Evaluation" by Florence I. Mahoney and co-authors. Discussion opened by Harriet E. Gillette; and "General Principles of Bracing in the Lower Extremity" by Herbert W. Park and Leonard D. Policoff. Discussion opened by Harry W. Mims. Officers of the section are Edward M. Krusen, Jr., Chairman; Harriet E. Gillette, Vice-Chairman and Louis P. Britt, Secretary.

MICHIGAN STATE MEDICAL SOCIETY MEETING DATES

The 1955 session of the Michigan State Medical Society is scheduled for September 28-30, Pantlind Hotel-Civic Auditorium, Grand Rapids, Mich. The 1956 session is scheduled for Detroit the week of September 24.

IN MEMORIAM

Dr. Russell L. Mantz, 79, of Cedar Rapids, Iowa, died July 20, 1954, of chronic nephritis at the Municipal Hospital, Spencer, Iowa. Dr. Mantz was affiliated with St. Luke's and Mercy Hospitals in Cedar Rapids. He was a Congress member for many years.

GRANT AWARDED TO CREIGHTON UNIVERSITY

On July 1, 1954, the National Foundation for Infantile Paralysis announced a five year grant of $114,436 awarded to Creighton University School of Medicine at Omaha, Nebraska, for the purpose of developing the concepts of rehabilitation throughout the medical curriculum. The grant is under the direction of Harold N. Neu, M.D., assisted by Harold A. Ladwig, M.D., and Fred J. Fricke, M.D.

POLIOMYELITIS AND REHABILITATION INSTITUTE

A two-day Institute in Poliomyelitis and Rehabilitation was sponsored by the Creighton University School of Medicine and the Nebraska State League of Nursing on September 2-3, Rehabilitation Center, Creighton Memorial St. Joseph's Hospital. Guest speakers included Gordon M. Martin, M.D., of Mayo Clinic.

PHYSICAL MEDICINE ABSTRACTS

Probenecid ('Benemid') in Gout. R. M. Mason. Ann. Rheumat. Dis. **13(2)**:120 (June) 1954.

Seven cases of gout treated by the use of probenecid were observed. Urinary uric acid and blood uric acid studies were conducted at the same time.

It is evident that, whatever the changes in the blood levels of uric acid, in a naturally occurring attack of gout, acute paroxysms can occur even though this level has been sharply brought to normal by the use of probenecid. This finding renders it difficult to believe that uric acid **per se** is responsible for initiating the acute paroxysm of gout. If this is accepted, then one possible explanation is that a precursor of uric acid is involved. The level of this precursor theoretically may be normal or abnormal. If colchicin acts by blocking the formation of this hypothetical precursor then this must be an abnormal precursor since colchicin has no effect on the level of uric acid in the plasma.

There is some evidence of another metabolic route in the formation of uric acid in gouty subjects. Findings of Shemin, Rittenberg, and Benedict using labeled glycine suggest that a more rapid mechanism exists for the transformation of glycine into uric acid in gout than in normals. This is consistent with the above findings when probenecid was used. It is possible that by removing the end product of the metabolic chain the formation of precursors of uric acid may be increased.

Paralysis of the Extra-ocular Muscles. H. Reed. Canad. M.A.J. **70(6)**:628 (June) 1954.

Congenital palsies of the ocular muscles are often overlooked and occur more frequently than is generally realized. They are seldom recognized during the first year of life and are commonly overlooked until childhood or even adult life. Minimal ocular palsies may cause considerable eye strain yet be dismissed as a minor muscle imbalance or be treated by orthoptic exercises.

Double vision may occur in middle life from muscular decompensation after years of maintenance of single binocular vision by vertical movement of the eyes. Ocular torticollis may develop in more severe palsies by tilting of the head and the face may develop eventually an asymmetry. Surgical procedures, of course, are ineffective because the head is tilted in order to maintain single vision. The results of suitable ocular surgery in congenital and traumatic cases are excellent.

One of the most valuable tests for palsy of ocular muscles is the cover test. A muscle anomaly is present if either eye moves to look at a distant light after being uncovered by the examiner.

The Nature of the Bone Changes Associated with Nerve Injuries and Disuse. J. A. Gillespie. J. Bone & Joint Surg. **36-B**:464 (Aug.) 1954.

It is well known that bone atrophies after certain nerve lesions and as a result of disuse. The change may result from loss of some specific neurotropic influence or, perhaps, to loss or alteration of its normal function. The nature of the so-called atrophy has not been thoroughly investigated. In particular, previous work has not established whether it is due to an alteration in the quality or merely to a reduction in the quantity of bone. Previous experimental work has been concerned chiefly with the effects of nerve lesions and disuse on the form of the affected bone, and, with few exceptions, little attention has been paid to the quality of the bone.

This paper describes experiments made to study changes occurring in the physical properties of the bones of a limb after section of its anterior or posterior nerve roots or peripheral nerves. Since it could be claimed that bone has been designed for the support of the body, the properties and quality of the bones were estimated in much the same way as supporting structures are investigated by engineers rather than by histological or chemical methods.

Twenty-eight kittens weighing 750 to 1200 gm. were subjected to laminectomy under general anesthesia and were divided into three groups. The first group of ten kittens had the anterior nerve roots of the fifth lumbar and first sacral segments sectioned. The

second group of ten kittens had the posterior nerve roots of the same segments divided. The third group, the remainder of kittens, had a lumbar sympathectomy on the same side, and at the same time an anterior nerve root section of similar segments. This additional measure, the sympathectomy, was performed in order to investigate the possibility that changes in the bones might be due in part to a deficient blood supply. The normally innervated limb acted as a control.

The kittens were kept in a large pen which allowed plenty of exercise. They were fed on a generous diet of fish, milk, porridge and approved commercial cat food, supplemented by cod liver oil. Two months after the operation the kittens were killed. The hind limbs were dissected free, skinned and weighed. The femora, tibiae and fibulae were carefully cleaned, and exposed to the air for several weeks at room temperature before being subjected to the various tests herein described. In this way, all bones had approximately the same moisture content. The muscle groups of each hind limb were weighed separately as they were removed.

In addition, experiments were made on sixteen young, white, male rats, weighing approximately 120 gm.; one hind limb was paralyzed by avulsion, under ether anesthesia, of the femoral and sciatic nerves. The animals were fed liberally on rat cake, which supplied a complete diet. They were killed four weeks after operation. The femora and tibiae were removed, cleaned and allowed to dry.

All bones were weighed. The femora of both kittens and rats were subjected to bending tests to allow the measurement of the bending movement, breaking stress and Young's modulus of elasticity. The specific gravity of a piece of cortex from the middle of the front of the shaft of each kitten femur was measured by weighing both in air and in water. The rat tibiae were dried overnight at 100 C., weighed and then ashed to constant weight in a muffle furnace at a temperature of 600 C. Densitometric readings were made at three selected points on the radiograph of each rat femur and an average value obtained for the bone. The lengths of the kitten femora and tibiae were measured from radiographs taken at a standard tube-target distance of six feet.

After the bony changes resulting from paralysis had been recorded two questions were considered. 1) What is the nature of the changes occurring in a limb bone after nerve lesions and disuse? 2) Are these changes due to direct loss of some specific neurotrophic influence or are they due to muscular inactivity?

An extremely careful and detailed analytic study of the results of the aforementioned tests on the paralyzed bones compared with the results of similar tests on the normal control bones led to the following conclusions:

1) Paralysis caused by anterior nerve root section or by peripheral nerve section leads to marked changes in the bones and muscles of the affected limb in experimental animals. Vascular changes are not the cause of the bone atrophy in a paralyzed limb; 2) the altered properties of the bones of a paralyzed limb are due almost entirely to a loss in the quantity of bone; bone quality is only slightly altered, and 3) the bone changes that follow paralysis are due to the secondary loss of muscular activity. No evidence could be obtained that nerves exert any specific, trophic influence on bone.

Intravenous Procaine in the Therapy of Acute Poliomyelitis. W. D. Paul, et al. Am. J. Phys. Med. 33:224 (Aug.) 1954.

One of the prime objectives of all modes of therapy for poliomyelitis has been to shorten the duration of pain and muscle spasm and to relieve the vasomotor instability. Reliable investigators claim that procaine with its analgesic, vasodilator and muscle relaxant properties can accomplish this objective. The authors base this paper on the doubt whether procaine can induce all of these beneficial effects.

To determine the beneficial effects of procaine, a study was carried out on forty-six patients ranging from seventeen to sixty-six years of age on whom a confirmed clinical diagnosis of acute poliomyelitis had been made. The patients were selected for the study because marked stiffness and pain was a major problem in therapy. Seventeen of the group were nonparalytic and twenty-nine had some muscular weakness.

Each patient was given an initial flexibility test which consisted of measurement of nine motions—two of the neck, four of the trunk and three of the hip. These readings were also graded from 0 to 4+ as to the pain produced by passive movement. From these measurements, the flexibility index was derived which was used as a tool for graphically evaluating progress.

Procaine hydrochloride was administered intravenously in a dosage of 4 mg./kg. as a 0.1 per cent solution in saline during a twenty minute period.

The patients' subjective reactions were recorded during and immediately following the intravenous infusions. A second flexibility test was carried out from three to five hours later and repeated again in twenty to twenty-six hours. The flexibility tests and infusions were given by one physician.

Procaine infusions were repeated every two to three days. An average of 4.4 infusions was given for each of the forty-six patients. Flexibility tests were repeated at intervals throughout the study. An average of 4.3 such examinations was recorded in

the forty-six patients. Vigorous physical therapy consisting of active and passive stretching and muscle reeducation was given in conjunction with the procaine infusions. Alternate cases with physical therapy alone were not used.

Upon analysis of the results the authors arrived at the following conclusions: 1) No benefits attributable to procaine were observed, and 2) flexibility tests with pain grading failed to indicate either a temporary analgesic effect or an increased rate of return towards normal flexibility.

Obstetrical Factors in the Etiology of Cerebral Palsy. Doris Latham, et al. Am. J. Obst. & Gynec. 68:91 (July) 1954.

Sixty-one cases of infants born at Johns Hopkins Hospital between 1950 and 1951 were culled from the records of the Maryland League for Crippled Children and the Harriet Lane Home for Invalid Children. These were compared with 11,195 births at the same hospital during the stated period.

The study group included eighteen prematures and forty-three full term babies. The mean age of the mothers of the cerebral palsied children was 25.4 years with 25.8 years the mean age for the control group mothers. Study of pelvic measurements and serologic tests was of no significance. Rh negativity was approximately in proportion to the control series.

None of the infants showed jaundice during the first forty-eight hours of life. Bleeding occurred in 39.3% of the cases sometime during gestation with one-fifth of the mothers bleeding during halves of pregnancy.

The average duration of labor showed little deviation from normal, but there was a high percentage of prolonged second stages.

Aside from the frequency of bleeding in pregnancy, the authors concluded that the most outstanding finding was the poor condition of the infants at birth which accounted for prolonged hospital stay.

An Observation Concerning the Flexor Muscles During Recovery of Function After Dislocation of the Elbow. N. J. Blockey. J. Bone & Joint Surg. 36-A:833 (July) 1954.

Careful study, utilizing comparative photography, and electro-diagnostic measures, of the recovery from dislocation of the elbow joint in twenty patients is discussed. The writer is opposed to the "simple mechanistic explanations advanced by physical therapists" used to explain the physiological changes in the healing joint.

Conclusions are reached which suggest that the pain is not the limiting factor to increased range of motion, but rather an inhibitory reflex mechanism which inhibits the motor muscle at a point just short of that which would require the breakdown of adhesions. The writer also concludes that this joint-protection reflex does not reach the conscious level.

Myelography to Help Localize Traction Lesions of the Brachial Plexus. I. M. Tarlov, and Robert Day. Am. J. Surg. 88:266 (Aug.) 1954.

Myelography is utilized to differentiate between intraspinal lesions involving the spinal nerve roots, and extraspinal involving the peripheral nerves resulting from traction lesions, especially in newborn infants.

If arachnoidal diverticula, or accummulations of opaque material lateral to the usual confines of the subarachnoid space, or if there is asymmetry of the axillary pouches, those on the side of paralysis being shut off, one may conclude that an intraspinal lesion is present.

Grip Test. Charles O. Bechtol. J. Bone & Joint Surg. 36-A:820 (July) 1954.

A grip dynamometer with adjustable handle spacings is described and carefully depicted in a series of photographs. Such handle spacing permits a more accurate evaluation of the force of grip of the injured hand.

Ankylosing Spondylitis and Prolonged ACTH Therapy. H. F. West, and G. R. Newns. Ann. Rheumat. Dis. 13(2):109 (June) 1954.

The maintenance of prolonged adrenal stimulation by the administration of ACTH is still an experimental procedure and as yet little detailed information on the subject has been published.

Six patients suffering from ankylosing spondylitis and treated by use of ACTH from eighteen to twenty-four months are presented. During the latter half of the treatment period adrenocortical activity was studied by assays of urinary 17-ketosteroids and urinary 17-ketogenic steroids. From this study one can determine that long continued adrenocortical stimulation has a place in the treatment of ankylosing spondylitis in only the most severe cases. This is only an opinion since in this study there were no controls and the course of spondylitis is unpredictable. The authors reserve this therapy for severe cases, who receive little benefit from deep x-ray therapy. The adrenal stimulation should not be raised to a higher level, nor maintained for a longer period than is absolutely necessary. Two complications were encountered in this study—hypertension and altered adrenal function.

The majority of patients with ankylosing spondylitis can be treated satisfactorily with aspirin, phenylbutazone, and deep x-ray therapy.

The Arteritis of Rheumatoid Arthritis. Bruce Cruickshank. Ann. Rheumat. Dis. 13(2):136 (June) 1954.

The occurrence of vascular lesions in rheumatoid arthritis has been recognized for some time, but interest in them has been sporadic until recently. In the last few years American authors have published detailed studies of arteritis found in skeletal muscles, subcutaneous nodules, and synovial tissue. Sokoloff and his colleagues regarded the lesion in the muscles as specific; but this has been questioned by other workers. The arteritis usually has been subacute, and occasionally there has been some association between these lesions and treatment by use of ACTH or cortisone.

Vascular lesions were sought in the heart and in other organs and tissues in seventy-two fatal cases of rheumatoid arthritis. Arteritis, past or present, was encountered in eighteen cases. In seven of these, lesions diagnostic of rheumatic heart disease were also found and the vascular involvement was confined mainly to the heart. In the remaining eleven cases there were no pathological processes found other than that of rheumatoid arthritis which might be associated with the arteritis, and the vascular lesions were considered to be that of arteritis of rheumatoid arthritis. This arteritis, though not specifically identifiable, can be differentiated from that of polyarteritis nodosa, rheumatic fever, systemic lupus, temporal arteritis, dermatomyositis, and scleroderma. It was usually of subacute form, sometimes with necrosis, and it affected small arteries or arterioles. Thrombosis was unusual and aneurysm formation was not seen. Some cases showed arteritis in different stages of development.

Osteitis Condensans Ilii and Its Differentiation from Ankylosing Spondylitis. Malcolm Thompson. Ann. Rheumat. Dis. 13(2):147 (June) 1954.

It is considered that osteitis condensans ilii or sacroiliac osteosclerosis is a specific pathological entity which can cause low back pain. Thirteen cases are described.

The differential diagnosis of osteitis condensans ilii is considered, with special reference to ankylosing spondylitis. Osteitis condensans ilii differs from the ankylosing spondylitis in that it occurs predominantly in females; it commonly appears during pregnancy; it produces pain more than stiffness; it does not restrict spinal movements as a prominent feature, and it is often unilateral. There is a sclerotic iliac lesion but no osteoporosis and the joint spaces are relatively normal. There is an absence of systemic reactions.

Seven cases initially diagnosed as osteitis condensans ilii have now been recognized as examples of ankylosing spondylitis. These represent a restricted or abortive type of spondylitis, more common in women than in men. It is possible that such abortive cases are more common than is thought, so that some of the credit claimed for radiotherapy in limiting the disease process may be due mainly to the natural course of the disease.

CHICAGO SOCIETY OF PHYSICAL MEDICINE AND REHABILITATION

will meet jointly with the Chicago Neurological Society on Tuesday, December 14, 1954 at 8:00 p.m., International Relations Center, 116 S. Michigan Ave., Chicago. Both groups will participate in a panel on "Electromyography and Its Applications." Details may be had by writing Gusta Davidsohn, M.D., Secretary, Mt. Sinai Hospital, 15th and California, Chicago.

BOOK REVIEWS

The reviews here published have been prepared by competent authorities and do not necessarily represent the opinions of the American Congress of Physical Medicine and Rehabilitation and/or the American Society of Physical Medicine and Rehabilitation.

ENERGY METABOLISM AND NUTRITION. By Professors *Raymond W. Swift* and *Cyrus E. French*. Cloth. Price, $5.75. Pp. 264, with 16 illustrations. Scarecrow Press, 3341 Prospect Ave., N. W., Washington 7, D. C., 1954.

Energy Metabolism and Nutrition is a textbook for seniors and graduate students who plan to conduct calorimetric experiments. This book gives, briefly and simply, methods and the underlying physical, chemical and physiological principles. Investigators who require more information than that given in the text can obtain this from the references given throughout the book.

The approach is critical; evaluation of the accuracy of data and their meanings are emphasized. This book is valuable for the inexperienced student and for those undertaking calorimetry for the first time.

PHYSICS FOR MEDICAL STUDENTS. By *J. S. Rogers*, D.Sc. Third edition. Cloth. Price, $5.50. Pp. 405, with illustrations. Cambridge University Press, 32 E. 57th St., New York 22; Bentley House, 200 Euston Rd., London, N.W.1; Melbourne University Press, Carlton, N.3, Victoria, 1953.

This book was first published in 1933 and appears now in its third edition. It is one of the first books which attempts to make physics palatable to the medical profession by illustrating principles of physics with examples taken from medicine and physiology. A number of physics books with the same aim, as well as books on medical physics and biophysics, have since been published in various countries and offer keen competition to the present new edition of *Physics for Medical Students*. The author approaches his goal somewhat differently from the authors of standard physics textbooks. His presentation is a supplement to textbooks in physics for first year university students studying for a science degree. The quality of the chapters fluctuates somewhat although most subjects are adequately covered. Very meager, however, are the reference lists at the end of each chapter. There are for example references to only three books at the end of the chapter on the therapeutic use of X- and gamma rays and all these were published over twenty years ago. One of the best portions of the book is the opening historical chapter on physics from pre-Grecian time to Newton.

THE PRINCIPLES OF EXERCISE THERAPY. By *M. Dena Gardiner*. Cloth. Price, $4.00. Pp. 260, with illustrations. (The Macmillan Company, 60 Fifth Avenue, New York 11); G. Bell and Sons, Ltd., London, 1953.

This book is written for use as a textbook for college level students of physical education and physical therapy. It is simply written and easy to understand.

The first chapter concerning basic mechanical principles of exercise therapy is of interest to those individuals who have had no training in physics. It does offer an understandable basis for exercise.

The text then passes to the matters of accomplishing the task at hand, namely proper methods to perform exercises. At this point, it would be more convenient to cover the material in the appendix. The abbreviations and terminology used are unfamiliar to students on this continent and their explanations are in the appendix.

While no errors in spelling or grammar were detected, there was a careless usage of words like abduct for adduct and vice versa; and transposition of affector and effector. This is confusing enough to a student without misusing them to add to the confusion.

While a bibliography reference is made to the work of DeLorme, no reference is made to this type of resistive exercise. The author contents herself with the use of the Swedish Remedial Exercises.

The book is no masterpiece of literature and it does not fill any particular missing niche in the Physical Medicine Library. There are many superior works on exercise and kinesiology and some tied more inti-

mately to the treatment of specific diseases or their residua.

RECREATION FOR THE AGING. Prepared for National Recreation Association by *Arthur Williams*. Cloth. Price, $3.00. Pp. 192. Association Press, National Council of the Y.M.C.A., 291 Broadway, New York 7, 1953.

This book is a planning guide for leaders who wish to provide recreational programs for older persons. Many of the recreational activities are applicable for handicapped or institutionalized older persons. It covers such activities as arts and crafts, camping and day camping, hobbies and hobby shows, music and drama, service and educational programs, social activities and spectator activities.

Since physicians who specialize in physical medicine and rehabilitation and the ancillary workers who assist them are becoming more and more involved with problems of geriatrics, this book may well be useful in planning recreational programs for their older patients. The book is well printed, clearly written and is provided with an adequate bibliography. It can be recommended as an aid for all persons who are planning recreational programs for older persons.

THE PSYCHIATRIC AIDE. HIS PART IN PATIENT CARE. By *Alice M. Robinson*, R.N., M.S. Foreword by *Walter E. Barton*, M.D. Cloth. Price, $3.00. Pp. 186, with illustrations. J. B. Lippincott Co., East Washington Square, Philadelphia 5, 1954.

This book is a clearly and simply written monograph which furnishes a considerable amount of general and personal information for the psychiatric aide in his relations to other members of the hospital staff, his patients, and his vocation. The book is divided into nine chapters each of which is prefaced by a short introduction written from the viewpoint of the beginner as a psychiatric aide. Each chapter attempts to answer a number of personal and professional questions regarding such elemental problems as the responsibilities of the psychiatric aide, the importance of his attitude to his work, and the opportunities for service to sick patients which he will encounter. It contains the basic elements essential in teaching the psychiatric aide the care of the hospitalized neuropsychiatric patient, outlining his responsibilities as a wardman and detailing work, such as the care of the patient at bedtime, meal time, and on the ward; his role in some of the special therapies. Chapters on the importance of attitudes, growth and development, and mental mechanisms provide background information to understanding the problem of mental diseases.

Some of the author's observations, i.e., "Anything in the way of physical or mental activity . . . . . can be classified as occupational therapy," and "the social worker is the closest link between the patient, his home, his family, and the community," are subject to interpretation. She writes in a style which is pleasing and easily read, and her unique approach to the problem constitutes a challenge to the reader.

The book should be found useful to anyone affiliated with the field of training for the psychiatric worker, volunteer workers in mental institutions, persons concerned with the special therapies, including occupational therapy and physical therapy, as well as relatives of mental patients.

The appendix provides a glossary of psychiatric terms, a brief reading list, and a simplified classification of mental illness, all of which add to the value of the book.

VITAMINS AND HORMONES: ADVANCES IN RESEARCH AND APPLICATIONS. VOLUME XI. Edited by *Robert S. Harris; G. F. Marrian*, and *Kenneth V. Thiman*. Cloth. Price, $8.50. Pp. 356, with illustrations. Academic Press, Inc., 125 East 23rd Street, New York 10, 1953.

There are thirteen contributors to this volume. The subject matter consists of studies and reviews of function, physiology and biochemistry of ascorbic acid, biochemistry and physiology of Vitamin D, endocrine disturbances in chronic human malnutrition, relation of pantothenic acid to adrenal cortical function, biochemistry of thyroid gland, evaluation of procedures for cytological localization of ketosteroids and synthesis of cortisone and related steroids.

This is a scholarly work with extensive bibliographies following each section. The reviews include recent developments with up-to-date references.

The book will be of definite interest to the biochemist and endocrinologist. Those who have a special interest in the subjects this book reviews will find this a valuable source book.

APHASIA THERAPEUTICS. By *Mary Coates Longerich*, Ph.D., and *Jean Bordeaux*, Ph.D. Cloth. Price, $3.75. Pp. 185. The Macmillan Company, 60 Fifth Avenue, New York 11, 1954.

Physical therapists and nurses will enjoy this book on aphasia. It is streamlined and cut down to the important procedures for examining and understanding the aphasia patient and giving him speech therapy. The authors are to be congratulated on devoting only three pages to history and two to terminology! The book quickly gets down to the business of symptomatology, which is systematically outlined in three groups—receptive, expressive and amnesic aphasia. Definitions

and specific symptoms are brief but adequately descriptive and may be easily located in their appropriate classifications.

Twenty-eight tests are used to make up the chapter on "Appraisal of the Patient's Capacities." Each test item is intended to measure a specific aspect of the patient's ability or disability. A most important chapter on "Initial Therapeutic Considerations" includes suggestions for evaluating the need of physical therapy, and over five pages of twenty-six items on the "Nurse's Attitude to the Patient."

Although the chapter on speech therapy is outlined, it is replete with suggestions on step-by-step methods and working materials. The last, but by no means least, of the chapters emphasizes the psychological goal of aiding the aphasia victim to recover his integrity as a well functioning individual.

This book loses none of its authority because of its manual-like style, since it has been previewed and the authors have been counselled by the leading investigators in the medicine and therapy of aphasia. Its pages will be well-worn by the workers in the field.

REACTIONS TO INJURY. British Medical Bulletin. Paper. Price, $2.75. Pp. 72. Oxford University Press, 114 Fifth Ave., New York 11, 1954.

As the title indicates, this bulletin issued by The British Council, is a compilation of several concise and factual articles dealing with various reactions of the individual to trauma. These reactions are both local, distant and generalized and are discussed individually by the several writers. They constitute a basic pathophysiological analysis of the experimental data and complete bibliographical annotations. Of particular interest to physiatrists is the article on Demyelination.

DISEASES OF THE LIVER, GALLBLADDER AND BILE DUCTS. VOLUMES I AND II. By *S. S. Lichtman*, M.D. Third edition. Cloth. Price, $22.00 per set. Pp. 608; 609-1315, with 223 illustrations. Lea & Febiger, 600 S. Washington Sq., Philadelphia 6, 1953.

The addition of new and revised data has expanded this authoritative and comprehensive work to two volumes. It has gone into its third edition, thoroughly revised. As in former editions, thorough coverage of the structure, function and pathologic anatomy, as well as the diagnosis and treatment of disorders of the liver and biliary tract, is given. Emphasis is placed on practical procedures.

The references at the end of each chapter are complete. In fact, the book includes an encyclopedia of all the important literature that has been published to date. For instance, there are 1228 references dealing with cirrhosis of the liver.

The author takes exception to some of the older concepts and logically proves the value of his current therapy. He believes that lipotrope therapy is important, that antibiotics may prove helpful, but that the uses of corticotropin (ACTH) and cortisone have been disappointing.

Studies with isotopes have shown that there is a recirculation of ascitic elements. The subject of biopsy of the liver and the new studies on the viruses that cause hepatitis are brought up-to-date. The illustrations are excellent.

This is an important reference work which should be in the hands of every student and clinician dealing with these diseases.

MAYO CLINIC DIET MANUAL. By Committee on Dietetics of Mayo Clinic. Second edition. Boards. Price, $5.50. Pp. 247. W. B. Saunders Company, 218 W. Washington Sq., Philadelphia 5; W. B. Saunders Company, Ltd, 7 Grape St., Shaftesbury Ave., London, W.C. 2, 1954.

The second edition of this manual revises and extends the scope of the first by the inclusion of new diet schemes and estimates. As stated in the text, "Every effort has been made to make this new revision as complete and as accurate as possible and to represent the current dietary practices at the Mayo Clinic and associated hospitals." The book is made to lie flat, as a cook book should, and has an extensive and useful cross-index system. The reviewer has a distaste, doubtless personal, for abbreviations; there may be humor in the selection of the abbreviation C.I.O. (common irritants omitted) for the allergy diet. The book is useful, and perhaps an essential item on the reference shelves of every hospital diet kitchen.

THE PAINFUL PHANTOM: PSYCHOLOGY, PHYSIOLOGY AND TREATMENT. By *Lawrence C. Kolb*, M.D. Paper. Price, $1.50. Pp. 50. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill.; Blackwell Scientific Publications, Ltd., 49 Broad St., Oxford, England; Ryerson Press, 299 Queen St., W., Toronto 2B, 1954.

Dr. Kolb, Section on Psychiatry, Mayo Clinic, reports on psychiatric interviews with twenty-seven amputees. Twenty-two of the patients developed their pain early and had difficulty using a prosthesis or refused to use one. The remaining five had an initially painless phantom or denied the existence of the phantom. They had successfully used a prosthesis and their pain was associated with an observed physical defect.

The author discusses phantom phenomena and their origin. He points out that various types and grades of sensory awareness may exist. Pain is one such manifestation. The physiological mechanism for phantom pain is

reviewed. The chief purpose of the book is to record the results of psychiatric study and treatment of the painful phantom. It is a well known fact that every physical disability results in some emotional reaction. This monograph clearly indicates the necessity for psychiatric consultation to assist the amputee and other patients who are physically disabled in the third phase of medical care.

ANNUAL REVIEW OF PHYSIOLOGY. Volume 16. *Victor E. Hall*, Editor; *Frederick A. Fuhrman*, Associate Editor, and *Arthur C. Giese*, Associate Editor. Cloth. Price, $7.00. Pp. 545. Annual Reviews, Inc., Stanford, California, 1954.

The *Annual Review of Physiology* incorporates in twenty-one short chapters the significant recent advances in selected areas of general, human and clinical physiology. The editors are themselves distinguished contributors to the various fields of investigative endeavor covered. Eight chapters were written by physiologists from Sweden, England, Canada, France and Switzerland. The combined bibliographies encompass roughly 5,000 papers and monographs published in an eighteen month period prior to June, 1953. As has been customary in recent years, the 16th volume of the Annual Review begins with a Prefatory Chapter by an outstanding exponent of the physiological sciences. In it Otto Loewi reflects on the attitudes of mind, habits of thought and spirit of those who devoted themselves in the past to the study of physiological processes. He contrasts these with current trends and sounds a warning which should be read by all those who aspire to a career of creative scholarship. The physiatrist will be interested especially in the sections of the text which deal with the cerebral cortex, the gamma efferent system, theories of behavior, human motor learning, skeletal muscle, muscular exercise, stress, pulmonary function tests, peripheral circulation, and energy metabolism.

METABOLISM OF STEROID HORMONES. By *Ralph I. Dorfman*, Ph.D. Cloth. Price, $4.00. Pp. 170, with illustrations and tables. Burgess Publishing Company, 426 S. Sixth St., Minneapolis 15, 1953.

The text is intended as a ready reference for the neophyte as well as the expert in the field of steroid hormone metabolism. Some forty-eight different tables are presented. The text is divided into nine chapters. In addition to a long listing of references, an adequate index is included. The publishing is good. As a reference text in the field of steroid hormone metabolism it is certainly a worthy and highly recommended one. It should prove of value to all interested physicians.

MEDICAL EDUCATION TODAY: ITS AIMS, PROBLEMS AND TRENDS. By *Joseph C. Hinsey*, M.D. Edited by *Dean F. Smiley*. Paper. Price, $1.50. Pp. 123, with 7 illustrations. The Journal of Medical Education, Association of American Medical Colleges, 185 N. Wabash Ave., Chicago 1, 1953.

This small, paper-bound monograph, is simply a collection of papers by individual authors on the subject of medical education. The papers have been published in various journals over the past few years.

CONNECTIVE TISSUES: TRANSACTIONS OF THE FOURTH CONFERENCE, FEBRUARY 18, 19 and 20, 1953, PRINCETON, N. J. Edited by *Charles Ragan*, M.D. Cloth. Price, $3.75. Pp. 197, with illustrations. Josiah Macy, Jr., Foundation, 16 W. 46th St., New York 36, 1953.

This text covers the Transactions of the Fourth Conference on Connective Tissues conducted February 18, 19, and 20, 1953 at Princeton, N. J. Some fifteen distinguished participant members including two guests participated in the conferences for the purpose of exchanging ideas, experiences, data and methods. Following the introductory remarks, the first third of the text consists of a discussion concerning general areas of agreement reached by the conference group regarding connective tissues. Subsequently the topic of isolation and characterization of mammalian striated myofibrils is discussed at length followed by an enlightening discussion of the effect of Vitamin A on organ cultures of skeletal and other tissues. The last third of the text is concerned with a most interesting discussion of the problems yet to be solved in the study of connective tissues. The subject material is very well presented and makes for both interesting and easy reading. This text should interest all scientific investigators and especially those in the field of tissue research.

DYNAMICS OF GROWTH PROCESSES. Edited by *Edgar J. Boell*. Cloth. Price, $7.50. Pp. 304, with illustrations. Princeton University Press, Princeton, N. J., 1954.

This volume consists of a series of thirteen papers presented at the Eleventh Growth Symposium. Each paper is a review of the developments, past and present, in a special interest field, as they relate to growth and differentiation in organisms. The material represents an excellent review of some of the fundamental mechanisms involved in the process of biological growth.

The authors of the various papers represent a cross section of related sciences and disciplines, and include bacteriologists, botanists, zoologists, biochemists, etc. It is the inclusion of so many different points of view, represent-

ing many biological disciplines, that is one of the features which makes this volume a valuable contribution.

Each paper is documented with an excellent bibliography. It seems to this reviewer that anyone interested in biological growth should make himself acquainted with the clearly written fundamentals of this book. It should serve as an important reference work, and is highly recommended.

TEXTBOOK OF PHYSIOLOGY: THE ACTIVITIES OF THE LIVING BODY. By *Caroline E. Stackpole*, A.M., and *Lutie Clemson Leavell*, R.N. Cloth. Price, $5.00. Pp. 418, with 128 illustrations. The Macmillan Company, 60 Fifth Ave., New York 11, 1953.

This textbook represents an outline of physiology designed for the beginning student in the subject. As a college or nursing school text, it should be an admirable choice. The time honored approach to the subject, that is, to classify the subject matter into various sections related to organs or organ systems of the body, has been modified. For instance, a section entitled: "Maintaining an awareness to the environment" deals with both nervous system and endocrines.

The approach of this book is one which ignores traditional departmental lines, and each subject is presented from an anatomical, biochemical and functional aspect. There is a tremendous amount of factual matter contained in the book. There are numerous original diagrams and illustrations which lend much clarity and simplicity to many sections. Each chapter is introduced with a terse outline. It concludes with a series of questions to be answered from the material of the chapter.

This is an excellent and clearly written elementary introduction to physiology. It is not recommended as a text for physicians, but seems to be ideally suited for most of the ancillary medical personnel, nurses, and physical therapists.

CURE YOUR NERVES YOURSELF. By *Louis E. Bisch*, M.D., Ph.D. Cloth. Price, $3.50. Pp. 247. Wilfred Funk, Inc., 153 E. 24th St., New York 10, 1953.

This is one of several books written by a noted psychiatrist to help people under tension solve many of their nervous and mental problems by themselves. It is written in terms that the layman can understand, and the illustrative case histories are simple and to the point.

Since tension resulting from mental and nervous problems is present in many patients seen by the physiatrist, this book is ideally suited for home treatment of these patients. However, this reviewer feels that of the numerous disturbances discussed in the book, only a few would be found among patients in the average Physical Medicine Department. It is also unfortunate that those conditions which the patient should not attempt to cure by himself are discussed in one of the last chapters. Until this chapter, the reader has the impression that he can cure every psychiatric problem.

It is felt that with proper direction by the physician, this book should be of considerable value to many patients.

TEXTBOOK OF MEDICAL TREATMENT BY VARIOUS AUTHORS. Edited by *D. M. Dunlop*, M.D.; *L. S. P. Davidson*, M.D., and *Sir John McNee*, M.D. Sixth edition. Cloth. Price, $9.50. Pp. 1023, with illustrations. Williams & Wilkins Co., Mount Royal and Guilford Aves., Baltimore 2; E. & S. Livingstone, Ltd., 16 & 17 Teviot Place, Edinburgh 1, 1953.

In this textbook an earnest attempt at completeness is made. Information given is as up-to-date as is possible in printed matter. Old remedies, which are frequently handed down from one text to another, have been eliminated. Explicit instructions in tested methods of treatment are listed.

It is evident from reading various chapters that the authors do not rely entirely on drugs for cure, but realize the importance of nursing care, rest, exercise and other aspects of good medical care. These ideas culminate in the final chapters on care of the disabled through the help of social agencies and physical treatment.

Throughout, the book is obviously English in origin and certain allowances must be made to adapt it to American use. The book is to be recommended as a current, easy to read, and interesting adjunct to standard American references on medical treatment.

LECTURES ON THE THYROID. By *J. H. Means*, M.D. Cloth. Price, $3.00. Pp. 113, with illustrations. Harvard University Press, Cambridge, 1954.

This volume represents collected lectures on the subject of the thyroid gland delivered by an eminent physician in the field before audiences and in various medical journals. The author's name is closely linked with present day knowledge in the field of thyroid disease and function.

This small volume offers an integrated coherent picture of present day knowledge of thyroid disease through its five progressive chapters. Each chapter represents an enlargement of a previous lecture on the subject delivered in an auspicious setting. The chapter titles indicate the scope of information covered, which extends from an interpretation of the integrated action of the endocrine system through the body need for iodine. Thus the life history of the thyroid gland is

told in an interesting, provocative and stimulating manner.

This survey will be found useful to research workers and students in the fields of anatomy, biopsy, biochemistry, and physiology. A subject index adds to the effectiveness of the book. There is a short list of references which covers each of the individual chapters.

HISTOLOGY. Edited by *Roy O. Greep*, Ph.D., with thirteen contributors. Fabrikoid. Price, $15.00. Pp. 953, with illustrations. The Blakiston Co., 575 Madison Avenue, New York 22, 1954.

This book provides standard treatment of microscopic anatomy at the level taught to medical and dental students. The book confines itself to fundamental aspects of anatomy as seen with the light microscope, with occasional references to X-ray microscopy and histochemical studies. However, this book does not depart from the standard concept or treatment of microscopic anatomy to attempt to integrate cellular and sub-cellular morphology with the function performed. The book is well written. The illustrations are good. One chapter is devoted to discussion of elements of histo-chemistry. The fundamental microscopic structure of the various body systems are dealt with. No attempt has been made to make this an exhaustive reference concerning microscopic anatomy.

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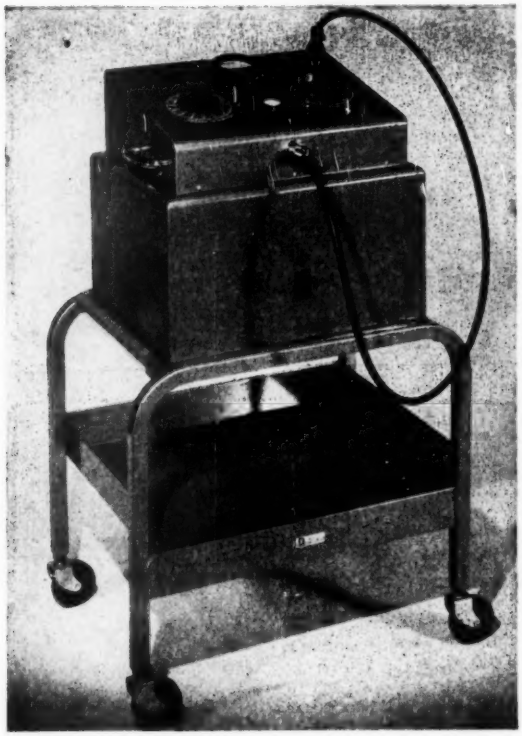

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U. S. Series "E" Savings Bonds earn interest at an average of 3% per year, compounded semi-annually, when held to maturity! And they can go on earning interest for as long as 19 years and 8 months if you wish.

If you want your interest as current income, ask your bank about 3% Series "H" Bonds which pay interest semiannually by Treasury check.

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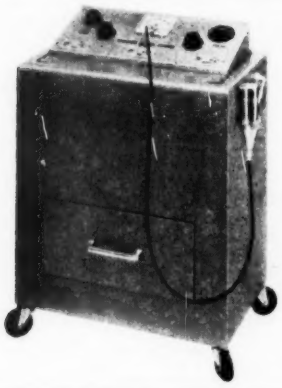
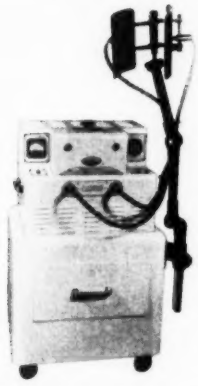


fischer ultra-sound

An oscillating circuit of high frequency current is produced by means of a vacuum tube, a tapped oscillating coil and two condensers. The frequency is 1,000,000 per second (1 Megacycle); this is impressed on the crystal in the Transducer causing the crystal to vibrate at the rate of 1,000,000 times per second, and thus the mechanical energy is transferred through the Transducer face in the form of mechanical vibrations. Either the Model 2500 Portable Unit or the Model 3000 Console Unit has sufficient watt output for any therapeutic application. Control switches, pilot lights, timer and all necessary operating features are on the panel plainly marked and easily accessible. Standard parts are used, replaceable at your radio supply shop in case of emergency.

Model 2500 Portable (continuous Ultra Sound): $345.00
Model 3000 Console (continuous and Impulse Technic): $495.00



fischertherm

The power of the Model 1200 Console Fischertherm is more than ample for the heaviest therapeutic demands, generated by two heavy duty power tubes having an approximate rated output of 400 watts, powered by a full wave rectifier and constant duty filtering system. The frequency is controlled at 27.120 MC. and is designed and engineered to operate continuously on heavy duty applications. An automatic electric timer turns current off at any time up to a maximum of 30 minutes. By simply turning the single control knob any type of applicators such as cuff electrodes, and cable may be used. The new type meter design permits full scale reading for the operating range of the machine rather than approximately a 1/3 scale reading for operating range.

Model 1200: $654.50

fischersine

If, through injury or disease, muscular ability is impaired, and an attempt is made to restore normal function by some electrical or physical means, and if the process thus instituted be much more rapid than is normal for the affected part, then fatigue and exhaustion may follow. If the process is much slower than normal, metabolism fails to assert itself. The smooth Galvanic Current of the Fischersine Model T-150 diminishes the blood supply by its contractile action, not only on the surface but in deeper tissues as well. The nonsurging Sine Wave Current induces cellular activity. The Surging Sinusoidal Current produces smooth, rhythmic muscle exercise and massage.

Model T-150: $176.00

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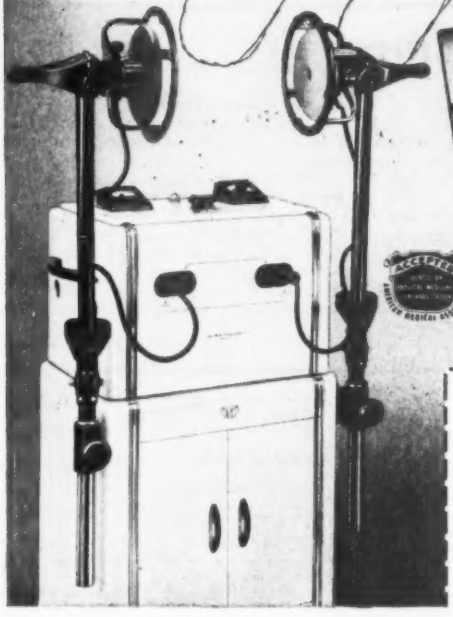
FEELING *is believing!*

•WHAT YOU "FEEL,"—YOU KNOW . . . and when patients "feel" the benefits of deep, comforting heat, they come back for more good diathermy treatments—and they tell others. That's why the L-F Model SW-660 Diathermy has satisfied so many patients, pleased so many doctors and won such outstanding recognition.

FOR FURTHER INFORMATION WITHOUT OBLIGATION JUST MAIL THE COUPON BELOW.



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THE LIEBEL-FLARSHEIM CO.
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Gentlemen: Without obligating me in any way, please let me have further information on the L-F Model SW-660 Diathermy Unit.

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Announcing . . .

The Annual Essay Award

sponsored by the

AMERICAN CONGRESS OF PHYSICAL MEDICINE AND REHABILITATION

To stimulate interest in the field of physical medicine and rehabilitation, the American Congress of Physical Medicine and Rehabilitation will award annually, a prize for an essay on any subject relating to physical medicine and rehabilitation. The contest, while open to anyone, is primarily directed to medical students, internes, residents, graduate students in the pre-clinical sciences and graduate students in physical medicine and rehabilitation. The Prize Lecture Committee suggests that members of the American Congress and American Society of Physical Medicine and Rehabilitation bring this announcement to the attention of interested persons. The following rules and regulations apply to the contest:

1. Any subject of interest or pertaining to the field of physical medicine and rehabilitation may be submitted.

2. Manuscripts **must be** in the office of the American Congress of Physical Medicine and Rehabilitation, 30 N. Michigan Ave., Chicago 2, not later than June 1, 1955.

3. Contributions will be accepted from medical students, internes, residents, graduate students in the pre-clinical sciences, and graduate students in physical medicine and rehabilitation.

4. The essay must not have been published previously.

5. The American Congress of Physical Medicine and Rehabilitation shall have the exclusive right to publish the winning essay in its official journal, the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION.

6. Manuscripts must not exceed 3000 words (exclusive of headings, references, legends for cuts, tables, etc.), and the number of words should be stated on the title page. An original and one carbon copy of the manuscript must be submitted.

7. The winner shall receive a cash award of $200, a gold medal properly engraved, a certificate of award and an invitation to present the contribution at the 33rd Annual Session of the American Congress of Physical Medicine and Rehabilitation at the Hotel Statler, Detroit, August 28-September 2, 1955.

8. The winner shall be determined by the Prize Lecture Committee composed of four members of the American Congress of Physical Medicine and Rehabilitation.

9. All manuscripts will be returned as soon as possible after the name of the winner is announced.

10. The American Congress of Physical Medicine and Rehabilitation reserves the right to make no award if, in the judgment of the Prize Lecture Committee, no contribution is acceptable. The Congress may also award certificates of merit to contributors whose essays may be considered second and third best submitted. Announcement of the winner will be made after the annual meeting.

The New

Birtcher MEGASON

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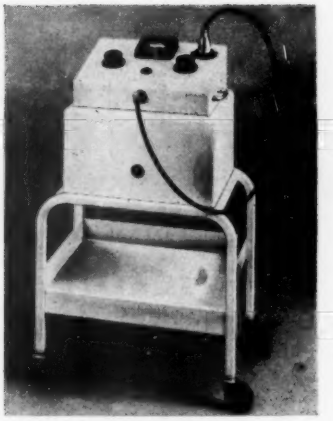
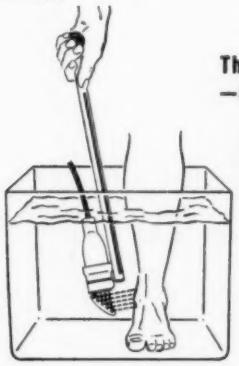


Ultrasonic Unit

with Underwater Treatment Set

In medical schools, hospitals, clinics and individual medical offices, the new Birtcher Megason is earning the respect of both operator and patient alike because of its consistently excellent performance.

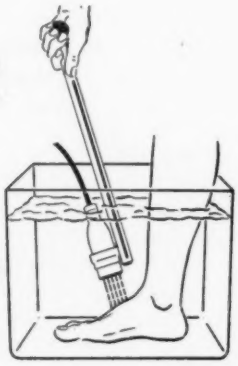
The Megason Direct-Reading Meter permits exact dosage measurements instantly, continuously. No figuring—no charts are necessary. Other features of equal importance are making the Megason the acknowledged leader in the field of Ultrasonic Therapy.

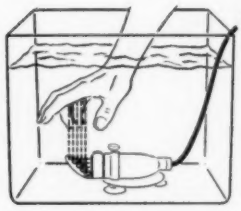


The Underwater Treatment Set —a new important accessory.

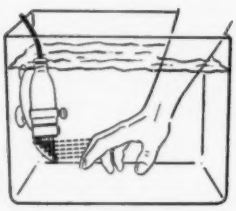
90 Degree Reflector—May be attached to Megason Transducer. Used under water, reflects sonic energy (nearly 100%) at right angle.

Handle for Transducer—This handy device entirely obviates the operator immersing hands in the water.





Transducer Stand—Suction cups hold the stand in position. Permits patient to move the hand or other anatomical part in the column of energy. Stand may also be held in place on side of tank for other applications.



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